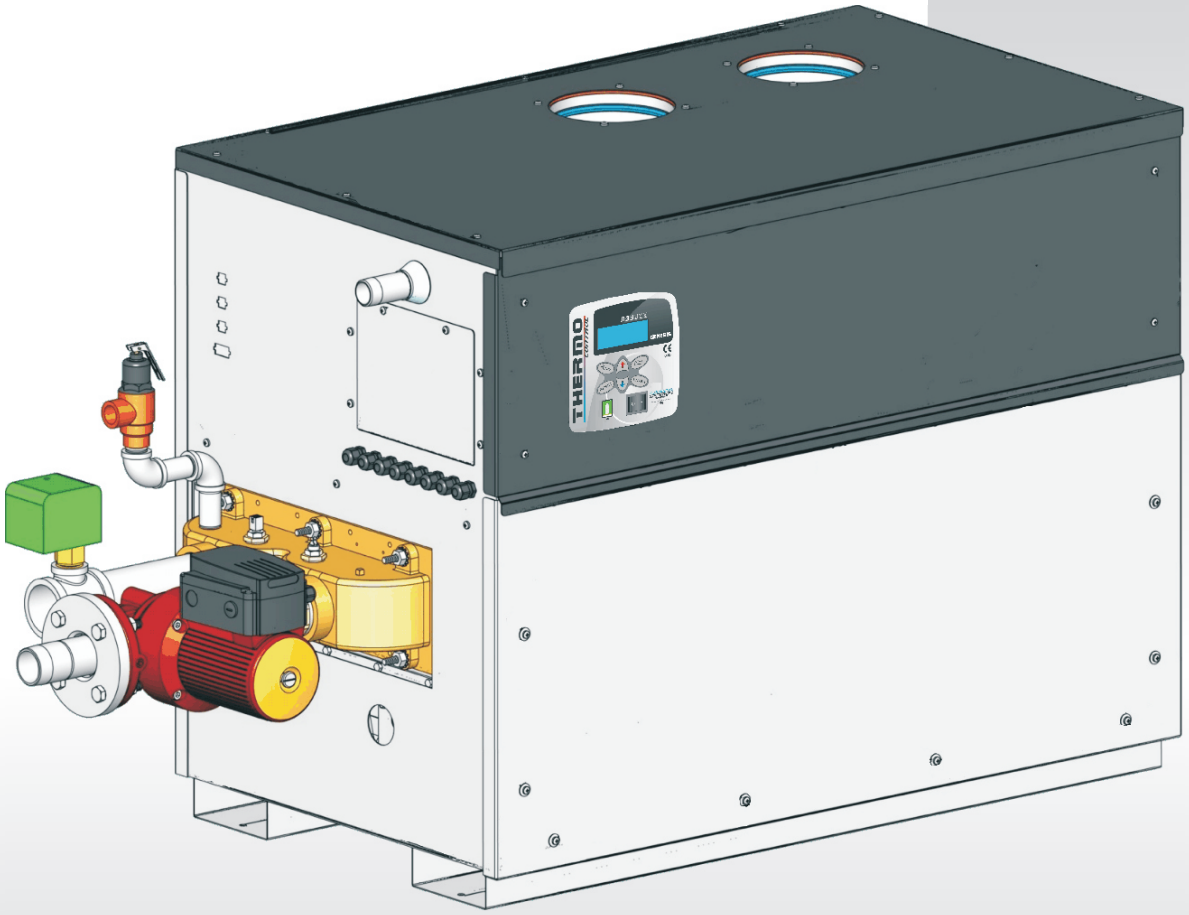
GWV

120

150

200



Installation User and Service Manual

A.O. SMITH

WATER PRODUCTS COMPANY

A DIVISION OF A. O. SMITH CORPORATION

CE

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your installer

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Read this manual carefully

Warning
Read this manual carefully before starting up the water heater. Failure to read this manual and to follow the instructions in this manual may lead to accidents, personal injury, and damage to the appliance.

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Although considerable care has been taken to ensure a correct and suitably comprehensive description of all relevant components, the manual may nonetheless contain errors and inaccuracies.

Should you detect any errors or inaccuracies in the manual, we would be grateful if you would inform us. This helps us to further improve our documentation.

More information

If you have any comments or queries concerning any aspect related to the appliance, then please do not hesitate to contact:

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In the event of problems with connecting to the gas, electricity or water supply, please contact your installation's supplier/installation engineer .

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Table of contents

1 Introduction - 9
1.1 About the appliance - 9
1.2 What to do if you smell gas - 9
1.3 Regulations - 9
1.4 Target groups - 10
1.5 Maintenance - 10
1.6 Forms of notation - 10
1.7 Overview of this document - 11

2 Working principle of the appliance - 13
2.1 Introduction - 13
2.2 General working principle of the appliance - 13
2.3 The appliance's heating cycle - 15
2.4 Protection for the appliance - 16
2.5 Safety of the installation - 18

3 Installation - 19
3.1 Introduction - 19
3.2 Packaging - 19
3.3 Environmental conditions - 20
3.4 Technical specifications - 22
3.5 Installation diagram - 25
3.6 Water connections, Vented - 26
3.7 Water connections, Unvented - 28
3.8 Gas connection - 29
3.9 Air supply and flue - 29
3.10 Electrical connection - 33
3.11 Checking the supply pressure and burner pressure - 36

4 Conversion to a different gas category - 41

5 Filling - 43
5.1 Installation diagram - 43
5.2 Filling unvented installations - 44
5.3 Filling vented installations - 45

6 Draining - 47
6.1 Installation diagram - 47
6.2 Draining unvented installations - 48
6.3 Draining vented installations - 49

7 The control panel - 51
7.1 Introduction - 51
7.2 Operation - 51
7.3 Meaning of icons - 51
7.4 Electronic controller ON/OFF switch - 51
7.5 Navigation buttons - 51
7.6 PC connection - 52

8 Status of the appliance - 53
8.1 Introduction - 53

Downloaded from www.Manualslib.com manuals search engine

8.2 Operating modes - 53
8.3 Error conditions - 54
8.4 Service condition - 54
8.5 Warning - 54

9 Starting and running - 55
9.1 Introduction - 55
9.2 Starting and running- 55
9.3 The appliance's heating cycle - 55

10 Shutting down - 59
10.1 Introduction - 59
10.2 Shutting the installation down for a brief period ("OFF mode") - - - - - - - 59
10.3 Isolating the appliance from the mains - 59
10.4 Shutting the appliance and storage tank down for a long period - - - - - - 59

11 Main menu - 61
11.1 Introduction - 61
11.2 Notational convention for menu-related instructions - - - - - - - - - - - - 61
11.3 Switching on the "ON mode" - 61
11.4 Setting the water temperature - 61
11.5 Week program - 62
11.6 Starting and stopping the week program - - - - - - - - - - - - - - - - - - 62
11.7 Changing the appliance's standard week program - - - - - - - - - - - - - 62
11.8 Adding times to a week program- 64
11.9 Deleting times from a week program- 65
11.10 Extra period- 65
11.11 Programming an extra period - 66
11.12 Settings- 67

12 Service program - 69
12.1 Introduction - 69
12.2 Setting the hysteresis - 69
12.3 Displaying the error history - 69
12.4 Displaying the appliance history - 69
12.5 Displaying the appliance selection - 70
12.6 Switching the pump on or off - 70
12.7 Setting the service interval - 70
12.8 Setting the display contrast - 70
12.9 Setting the display backlight switching period - - - - - - - - - - - - - - - 70
12.10 Setting the display scroll speed - 70
12.11 Setting the stage difference for the appliance - - - - - - - - - - - - - - - 70
12.12 Setting the pump running-on time - 71

13 Troubleshooting - 73
13.1 Introduction - 73
13.2 Troubleshooting table for general errors - - - - - - - - - - - - - - - - - - 74
13.3 Troubleshooting table for displayed errors - - - - - - - - - - - - - - - - - 76
13.4 Warnings - 85

14 Maintenance frequency - 87
14.1 Introduction - 87
14.2 Determining service interval - 87

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15 Performing maintenance - 89
15.1 Introduction - 89
15.2 Preparation for maintenance - 89
15.3 Water-side maintenance - 91
15.4 Gas-side maintenance - 92
15.5 Finalizing maintenance - 92

16 Warranty (certificate) - 93
16.1 General warranty - 93
16.2 Appliance warranty - 93
16.3 Conditions for Installation and use - 93
16.4 Exclusions - 94
16.5 Scope of the warranty - 94
16.6 Claims - 94
16.7 Obligations of A.O. Smith - 94

17 Appendices - 95
17.1 Introduction - 95
17.2 Electrical diagram - 96
17.3 Week program card - 99

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1 Introduction

1.1 About the appliance

This manual describes how to install, service and use the GWV appliance. This appliance is a closed, gas-fired water heater with a fan in the air supply. The appliance is always supplied together with a storage tank.

The possible categories for this appliance are C13, C33, and B23.

The information in this manual applies to the: GWV 120, GWV 150 and GWV 200.

CE
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The appliance has been manufactured and equipped in accordance with the European standard for gas-fired storage water heaters for the production of domestic hot water (EN 89). The appliances are therefore compliant with the European Directive for Gas Appliances, and are entitled to bear the CE mark.

Warning
Read this manual carefully before starting up the installation. Failure to read the manual and to follow the printed instructions may lead to personal injury and damage to the appliance.

1.2 What to do if you smell gas

Warning
If there is a **gas smell**:

No naked flames! No smoking!

Avoid causing sparks! Do not use any electrical equipment or switch, i.e. no telephones, plugs or bells!

Open windows and doors!

Shut off the mains gas supply valve!

Warn occupants and leave the building!

After leaving the building, alert the gas distribution company or your installation engineer.

1.3 Regulations

As the (end) user, installation engineer or service and maintenance engineer, you must ensure that the entire installation complies, as a minimum, with the official local:

- building regulations;
- energy supplier's directives for existing gas installations;
- directives and technical guidelines for natural gas installations;
- safety requirements for low-voltage installations;
- regulations governing the supply of drinking water;
- regulations governing ventilation in buildings;
- regulations governing the supply of air for combustion;
- regulations governing the discharge of products of combustion;
- requirements for installations that consume gas;
- regulations governing indoor waste water disposal;
- regulations imposed by fire brigade, power companies and municipality.

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Furthermore, the installation must comply with the manufacturer's instructions.

Note
Later amendments and/or additions to all regulations, requirements and guidelines published on or prior to the moment of installing, will apply to the installation.

1.4 Target groups

The three target groups for this manual are:

- (end) users;
- installation engineers;
- service and maintenance engineers.

Symbols on each page indicate the target groups for whom the information is intended. See the table.

Target group symbols

Symbol	Target group
	(End) user
	Installation engineer
	Service and maintenance engineer

1.5 Maintenance

A service should be carried out at least once a year, both on the water side and on the gas side. Maintenance frequency depends, among other things, on the water quality, the average burning time per day and the set water temperature.

Note
To determine the correct maintenance frequency, it is recommended to arrange for the service and maintenance engineer to check the appliance on both the water and gas side within three months following installation. Based on this check, the best maintenance frequency can be determined.

Note
Regular maintenance extends the service life of the appliance.

Note
Both the end user and the service and maintenance engineer are responsible for regular maintenance. They will need to establish clear agreements on this.

Note
If the appliance is not regularly maintained, the warranty will become void.

1.6 Forms of notation

The following notation is used in this manual:

Note
Important information.

Caution
Ignoring this information can lead to the appliance being damaged.

Warning
Failure to carefully read this information may lead to personal injury and serious damage to the appliance.

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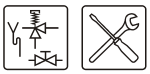
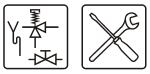
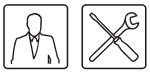
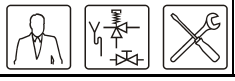
1.7 Overview of this document

The table provides an overview of the contents of this document.

Contents of this document

Chapter	Target groups	Description
Working principle of the appliance		This chapter describes how the appliance functions.
Installation		This chapter describes the installation activity to be completed before you actually start up the appliance.
Filling		This chapter describes how to fill the appliance.
Draining		This chapter describes how to drain the appliance.
The control panel		This chapter describes the general control of the appliance using the display.
Status of the appliance		This chapter describes the status (mode or condition) that the appliance may have, and possible actions to take.
Starting and running		This chapter describes how to start the appliance running. The general heating cycle of the appliance is also described.
Shutting down		This chapter describes how to shut the appliance down for a brief or long period of time.
Main menu		This chapter describes the main menu of the display. This is the actual menu for the user, however the installation engineer and service and maintenance engineers will also need to use this menu.
Service program		This chapter describes the service menu. It is mainly intended for the installation engineer and service and maintenance engineers. End users may also refer to this chapter for additional information about the appliance.
Troubleshooting		This chapter is mainly intended for the installation engineer and the service and maintenance engineer. It describes appliance errors. These errors are indicated on the display. A troubleshooting table of possible causes and solutions is provided. End users may also refer to this chapter for additional information about the appliance.
Maintenance frequency		This chapter describes how to determine the optimum frequency at which to carry out maintenance. Both the end user and the service and maintenance engineer are responsible for regular maintenance. They need to reach clear agreement on this. **Note** If the appliance is not regularly maintained, the warranty will become void.
Performing maintenance		This chapter sets out the maintenance tasks to be carried out during a service.
Warranty (certificate)		This chapter states the warranty terms and conditions.

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2 Working principle of the appliance

2.1 Introduction

Topics covered in this chapter:

- General working principle of the appliance;
- The appliance's heating cycle;
- Protection for the appliance;
- Safety of the installation.

2.2 General working principle of the appliance

The figure shows a cut-away view of the appliance.

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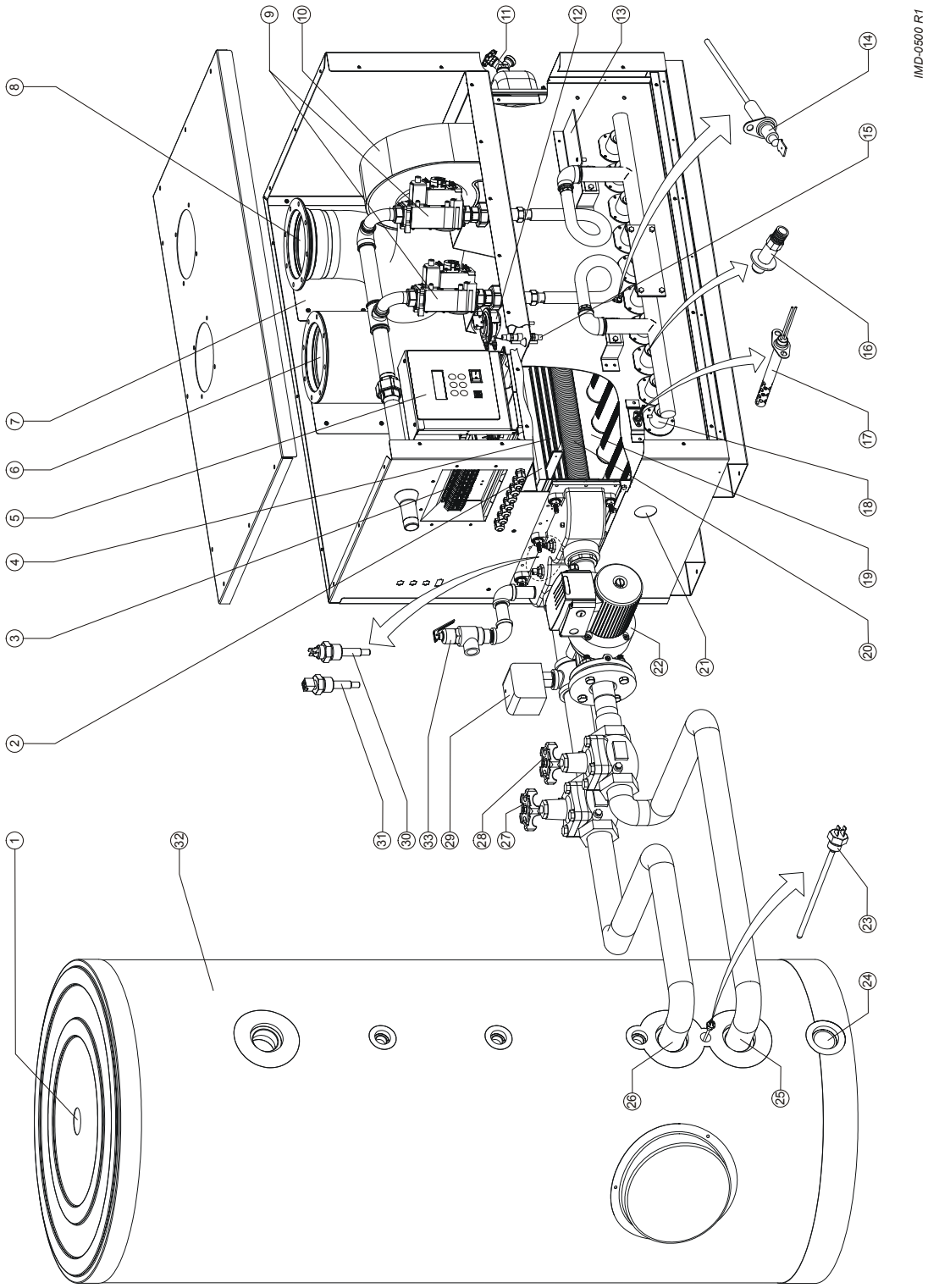
Cut-away view of the appliance



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Legend

1. Hot water outlet
2. Insulation layer
3. Electrical connector block
4. Aluminium strips
5. ThermoControl (electronic controller)
6. Flue gas discharge
7. Jacket cover plate
8. Air supply
9. Gas controls
10. Fan
11. Drain valve
12. Pressure switch
13. Air distributor plate
14. Flame probe
15. Hot surface igniter/flame probe connector
16. Injectors
17. Glow plug
18. Bar burners
19. Combustion chamber
20. Heat exchanger
21. Inspection glass
22. System pump:
23. Temperature sensor T_3
24. Cold water inlet
25. Inlet line
26. Return line
27. Return valve
28. Supply valve
29. Flow-through switch:
30. Temperature sensor T_1
31. Temperature sensor T_2
32. Storage tank
33. P-valve

In this appliance, the cold water enters the bottom of the storage tank through the cold water inlet (24). The system pump (22) ensures that the water flows into the appliance. The water is heated by the heat exchanger (20) in the combustion chamber (19).

The heated water leaves the appliance via the return valve (26) and then, once heated, flows into the storage tank (32).

To prevent condensation from forming in the appliance, the water that flows into it via the supply line (25) must not be colder than 30°C. This will only be the case the very first time, or after it has been shut down for a long period.

Once the appliance and the storage tank are completely filled with water, they are permanently pressurised by the water pipes. As hot water is drawn from the storage tank, cold water is immediately added.

Water flows into the appliance through the ribbed elements (20). This ribbing ensures better heat transfer. There are aluminium strips (4) on these elements. These slow down the flue gases, improving the yield. The air required for combustion is forcibly delivered by the fan (10).

The appliance has two identical gas controls (9) of which one will be open (partial load) or both (full load). Thanks to the modulated supply of gas and air (8), the optimum gas/air mixture is always achieved. The flue gases are removed via the flue gas outlet pipe (6). The air supply and flue gas outlet are always in parallel.

The insulation layer (2) prevents heat loss. To protect against corrosion, the storage tank is enamelled on the inside. Anodes provide extra protection against corrosion.

For maintenance, the storage tank has an aperture for inspection and cleaning.

2.3 The appliance's heating cycle

The appliance uses sensor T_3 (23) to determine whether the water temperature set (T_{set}) has been reached. When $T_3$is lower than the set water temperature (T_{set}), the electronic controller registers a "heat demand". This will switch the system pump on and the flow-through switch (29) will give a signal to the controller. The appliance will ignite and the water will be heated. Once T_3 gets above T_{set}, the demand for heat has been met and the electronic control stops the heating cycle; the system pump (22) keeps running (12.12 "Setting the pump running-on time") for a little while.

The electronic controller assumes a certain margin when ending a heat demand. We refer to this margin as the hysteresis (12.2 "Setting the hysteresis").

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2.4 Protection for the appliance

2.4.1 Introduction

The electronic controller monitors the water temperature and ensures safe combustion. This is achieved by:

- the Water temperature protection
- the Gas control
- the Fan
- the Pressure switch
- the Flame probe
- the Flow-through switch

2.4.2 Water temperature protection

The electronic controller monitors the water temperature with temperature sensors T_1, T_2 and T_3 as shown in the table.

Temperature protection

Safety	Description
T_1, T_2, T_3 > 98°C	The appliance switches back to partial load once the heat demand has been met.
For additional safety T_1, T_2, T_3 > 99°C	A lockout error of the appliance occurs. The controller must be manually reset before the appliance can resume operation (8.3 "Error conditions"). The reset may only be performed if T_3 < 90°C.

2.4.3 Gas control

When heat is required, the controller (5) opens the left-hand gas control (9) so that the gas can flow into the premix bar burners (18) of the first tray of burners. The air is mixed in with the gas at the front of the burners. The hot surface igniter (17) ignites the leftmost burner. The adjacent burners then ignite from left to right.

If more heat is demanded, the controller opens the second gas control (9) as well. There is no separate igniter for the ignition of the second tray of burners.

The gas controls have two valves as safety devices. The valves shut off the gas supply.

Smooth ignition is achieved by opening the gas controls with a delay ("softlite").

2.4.4 Fan

The fan (10) provides an optimum air supply (8) when there is a heat demand. This air comes into a separate chamber on the air distribution plate (13). Overpressure is created in the space and the air can only escape the appliance via the premix bar burners (18).

As a safety feature, the fan ensures that any gases present in the combustion chamber are removed, both before and after combustion. We refer to this as pre-purge and post-purge.

The fan speed is continuously monitored by the electronic controller (5). The electronic controller takes control if the speed of rotation varies too much from the set value.

2.4.5 Pressure switch

The pressure switch (12) guarantees the air supply during pre-purging and when the appliance is operational. The standard position of the pressure switch is open. When sufficient pressure difference is reached, the pressure switch closes. However, in the event of a fault, the pressure switch is tripped open, and the heating cycle is interrupted.

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Pressure measurements are made at the air distribution plate (high pressure) and in a Venturi in the burners (low pressure).

The table shows the trip point per appliance.

Note
The trip point of the pressure switch is not adjustable.

Pressure switch trip points

Appliance	Closing pressure differential	Opening pressure differential
GWV 120	≥ 80 Pa	≤ 66 Pa
GWV 150	≥ 89 Pa	≤ 75 Pa
GWV 200	≥ 107 Pa	≤ 92 Pa

2.4.6 Flame probe

To ensure that no gas can flow when there is no combustion, the water heater has a flame probe (14). The electronic controller uses this probe for flame detection, by means of ionisation detection. The electronic control closes the gas valve as soon as it detects that no flame is present.

2.4.7 Flow-through switch

the flow-through switch (29) guarantees the flow of water through the appliance (before operation and while the appliance is running). The standard position of the flow-through switch is open. When the flow is sufficient, the switch closes and the heating cycle starts. If the flow of water through the appliance gets too low, then the switch opens, which interrupts the heating cycle; this is to prevent overheating.

Flow measurement is done in the return line between the appliance and the storage tank.

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2.5 Safety of the installation

As well as the standard safeties in the appliance (2.4 "Protection for the appliance"), it must also be protected by an inlet combination and a pressure-reducing valve. A P-valve is also used.

2.5.1 Unvented installation

With unvented installation, an expansion valve and expansion vessel prevent excessive pressure in appliance. This prevents damage being caused to the enamelled coating (in the appliance) or to the heat exchanger. A non-return valve prevents excessive pressure build-up in the water supply system. This valve also prevents water from flowing backwards from the storage tank into the cold water supply system. The pressure-reducing valve protects the installation against excessively high water supply pressures (> 8 bar). These components are fitted (3.6 "Water connections, Vented") to the cold water pipe.

2.5.2 Vented installation

With a vented installation, excess pressure is taken up by the open water tank. The height of the head tank determines the working pressure in the appliance, which may not exceed 8 bar. The appliance must also be fitted with a vent pipe from the hot water pipe, which opens into the cold water tank.

Normally, the vent pipe should discharge into a separate discharge channel/drain or otherwise to the open cold water head tank. The appliance should also be fitted with a stop valve (3.6.2 "Hot water side") on the hot water side.

2.5.3 Inlet combination and pressure-reducing valve

An excessively high pressure in the storage tank can damage the enamelled layer. An inlet combination and pressure-reducing valve prevents this. The inlet combination acts as a stop valve, non-return valve and overflow valve. If the water supply pressure is too high (> 8 bar), a pressure-reducing valve must be used. Both components must be fitted in the cold water supply (3.6 "Water connections, Vented").

2.5.4 P-valve

The appliance has a P-valve (33) as standard. A P-valve (Pressure Relief Valve) monitors the pressure in the installation. If the pressure gets too high (> 10 bar), the valve will open. The water can now flow out of the installation. Because the installation is under water supply pressure, cold water will automatically flow into the storage tank. The valve remains open until the unsafe situation (< 10 bar) has been resolved.

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3 Installation

Warning
Installation work should be carried out by an approved installation engineer in compliance with the general and local regulations imposed by the gas, water and power supply companies and the fire service.

The appliance may only be installed in a room that complies with the requirements stated in national and local ventilation regulations (1.3 "Regulations").

3.1 Introduction

This chapter describes the installation activities to be carried out before you actually start using the appliance (9 "Starting and running"), namely:

- Packaging;
- Environmental conditions;
- Technical specifications;
- Installation diagram;
- Water connections, Vented,
- Gas connection;
- Air supply and flue;
- Electrical connection;
- Checking the supply pressure and burner pressure.

For a possible conversion to a different gas category, see conversion (4 "Conversion to a different gas category").

3.2 Packaging

To avoid damaging the appliance, remove the packaging carefully.

We recommend unpacking the appliance at or near its intended location.

Caution
The appliance may only be manoeuvred in an upright position. Take care that the appliance is not damaged after unpacking.

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3.3 Environmental conditions

Caution
An open appliance may not be used in rooms where chemical substances are stored or used due to the risk of explosion and corrosion of the appliance. Some propellants, bleaching agents and degreasing agents etc. disperse vapours that are explosive and/or cause accelerated corrosion. If the appliance is used in a room in which such substances are present, the warranty will be void.

The appliance is suitable for both open and closed combustion.

For closed combustion, the air supply required is independent of the room in which it is installed. In this event, there are no additional ventilation requirements. Appliance types possible here are C13 and C33.

The appliances can also be installed as open appliances and may then only be placed in an open boiler room. The appliance type is B23.

3.3.1 Air humidity and ambient temperature

The boiler room must be frost-free, or be protected against frost. The table shows the environmental conditions that must be adhered to for correct functioning of the electronics present in the appliance to be guaranteed.

Air humidity and ambient temperature specifications

Air humidity and ambient temperature	
Air humidity	max. 93% RV at +25°C
Ambient temperature	Functional: 0 ≤ T ≤ 60°C

3.3.2 Maximum floor loading

Allow for the weight of the appliance and the storage tank with respect to the maximum floor loading; refer to the tables.

Specifications of the weight of the appliance, with respect to the maximum floor loads.

Weight of the appliance (kg)	
GWV 120	225
GWV 150	250
GWV 200	300

Specifications of the weight of the storage tank, with respect to the maximum floor loads.

Weight of the storage tank filled with water (kg)	
ST 400	505
ST 500	630
ST 600	855
ST 750	965
ST 1000	1315

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3.3.3 Water composition

The appliance is intended for heating drinking water. The drinking water must comply with the regulations governing drinking water for human consumption. The table gives an overview of the specifications.

Water specifications

Water composition	
Hardness (alkaline earth ions)	> 1.00 mmol/l: • German hardness > 5.6° dH • French hardness > 10.0° fH • British hardness > 7.0° eH
Conductivity	> 125 µS/cm
Acidity (pH value)	7,0 < pH value < 9.5

Note
If the water specifications deviate from those stated in the table, the storage tank protection cannot be guaranteed (16 "Warranty (certificate)").

If the water hardness is greater than 4° dH, please contact A.O. Smith.

3.3.4 Working clearances

For access to the appliance and the storage tank it is recommended that the following clearances are observed:

- Around the appliance and the storage tank: 50 cm.
- Above the storage tank (room to replace the anodes):
  - 100 cm if using fixed anodes, or
  - 50 cm if using flexible anodes.

  If the available clearance is less than 100 cm, flexible magnesium anodes may be ordered.

Note
When installing the appliance and storage tank, be aware that any leakage can cause damage to the immediate environment or floors below. If this is the case, the appliance should be installed above a wastewater drain or in a suitable metal leak tray.

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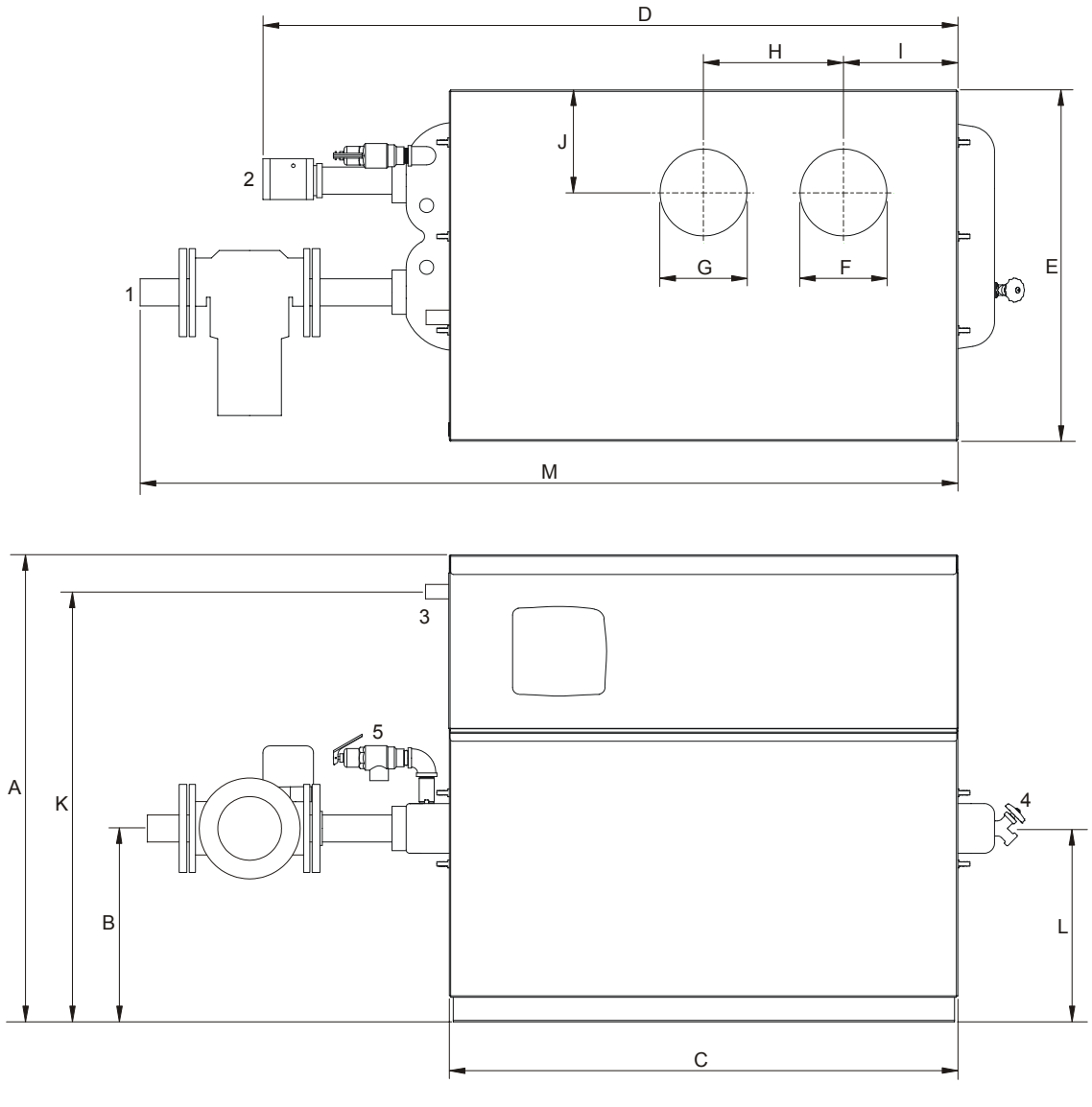
3.4 Technical specifications

Check the dimensions (3.4.1 "Dimensions of the appliance"), the gas data (3.4.3 "Gas data") and other specifications (3.4.2 "General and electrical specifications") of the appliance.

3.4.1 Dimensions of the appliance

Plan and elevation of the appliance



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Dimensions (all measurements in mm unless otherwise indicated)

Size	Description		GWV 120	GWV 150	GWV 200
A	Overall height		835	835	835
B	Height of pump connection + heat exchanger outlet		350	350	350
C	Length of appliance		910	1065	1465
D	Length including flow switch		1230	1495	1895
E	Width of appliance		625	625	625
F	Air supply diameter		150	150	200
G	Diameter of flue gas discharge		150	150	200
H	Centre-to-centre distance between air supply/flue gas outlet		300	300	480
I	Air supply distance		160	240	260
J	Air supply/flue gas discharge distance		185	185	185
K	Height of gas connection		760	760	760
L	Height of drain valve connection		345	345	345
M	Length including pump		1500	1680	2100
1	Supply connection (external)		R $1^1/_2$	R 2	R 2
2	Return connection (internal)		Rp $1^1/_2$	Rp 2	Rp 2
3	Gas connection (external)		R 1	R 1	R 1
4	Drain valve connection (internal)		$^3/_4$"	$^3/_4$"	$^3/_4$"
5	P-valve connection (internal)		$^3/_4$"	$^3/_4$"	$^3/_4$"

3.4.2 General and electrical specifications

Chimney data

Chimney[1]	Unit		GWV 120	GWV 150	GWV 200
Not insulated (max. length)	m		8	8	8
Not insulated (number of bends)	-		2	2	2
Not insulated with condensation removal (max. length)	m		20	20	20
Not insulated with condensation removal (number of bends)	-		2	2	2
Insulated (max. length)	m		20	20	20
Insulated (number of bends)	-		2	2	2

1) Stated lengths and bends apply for both flue gas removal and air supply

Tap capacity

Tap capacity (Tcold = 10°C)	Unit		GWV 120	GWV 150	GWV 200
Maximum temperature regulated	°C		85	85	85
continuous ΔT=28°C	l/h		3041	3787	4838
continuous ΔT=44°C	l/h		1935	2410	3078
continuous ΔT=50°C	l/h		1703	2121	2709
continuous ΔT=55°C	l/h		1548	1928	2463
continuous ΔT=70°C	l/h		1216	1515	1935

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Contact ratings

	Unit		GWV 120	GWV 150	GWV 200
Electrical power consumption	W		200	210	350
Supply voltage	VAC		230 (+10 -15%) - 50Hz		

Operating pressure

	Unit		GWV 120	GWV 150	GWV 200
Operating pressure	bar		8	8	8

3.4.3 Gas data

Gas data

Description II_{2H3P}	Unit		GWV 120	GWV 150	GWV 200
Gas category 2H: G20 - 20 mbar					
Orifice diameter	mm		2,31	2,31	2,31
(1) = Blank plate (2) = Burner pressure regulator			2	2	2
Nominal load (upper value)	kW		122,2	152,1	194,3
Nominal output	kW		99,0	123,3	157,5
Supply pressure	mbar		20	20	20
Burner pressure	mbar		2 x 8.9	2 x 9.3	2 x 8.0
Gas consumption*	m^3/h		11,5	14,3	18,4
Number of burners (total)	-		8	10	15
Gas category 3P: G31 – 37 mbar					
Orifice diameter	mm		1,50	1,50	1,50
(1) = Blank plate (2) = Burner pressure regulator (3) = High/low regulator			2	2	2
Nominal load (upper value)	kW		111,1	138,8	216,6
Nominal output	kW		90,0	112,5	175,5
Supply pressure	mbar		37	37	37
Burner pressure	mbar		2 x 13.3	2 x 12.7	2 x 14.5
Gas consumption	kg/h		7,8	9,7	15,1
Number of burners (total)	-		8	10	15
* Gas consumption at 15°C and 1013.25 mbar					

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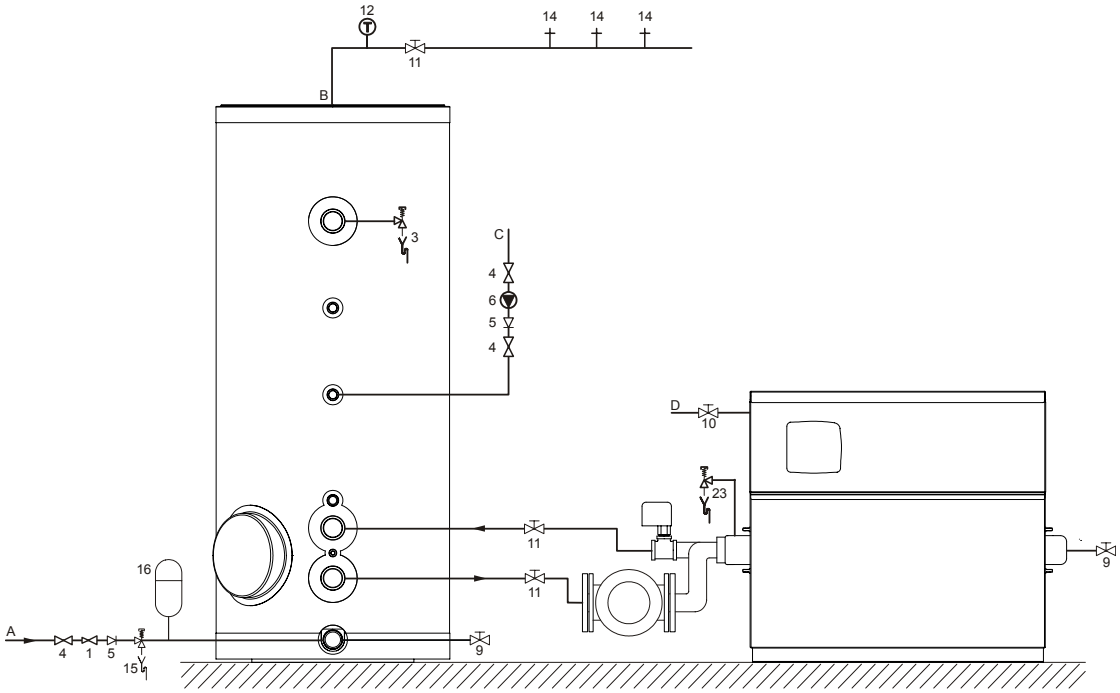
3.5 Installation diagram

This figure shows the installation diagram. This diagram is used in the sections in which the actual connection process is described.

Installation diagram

Unvented



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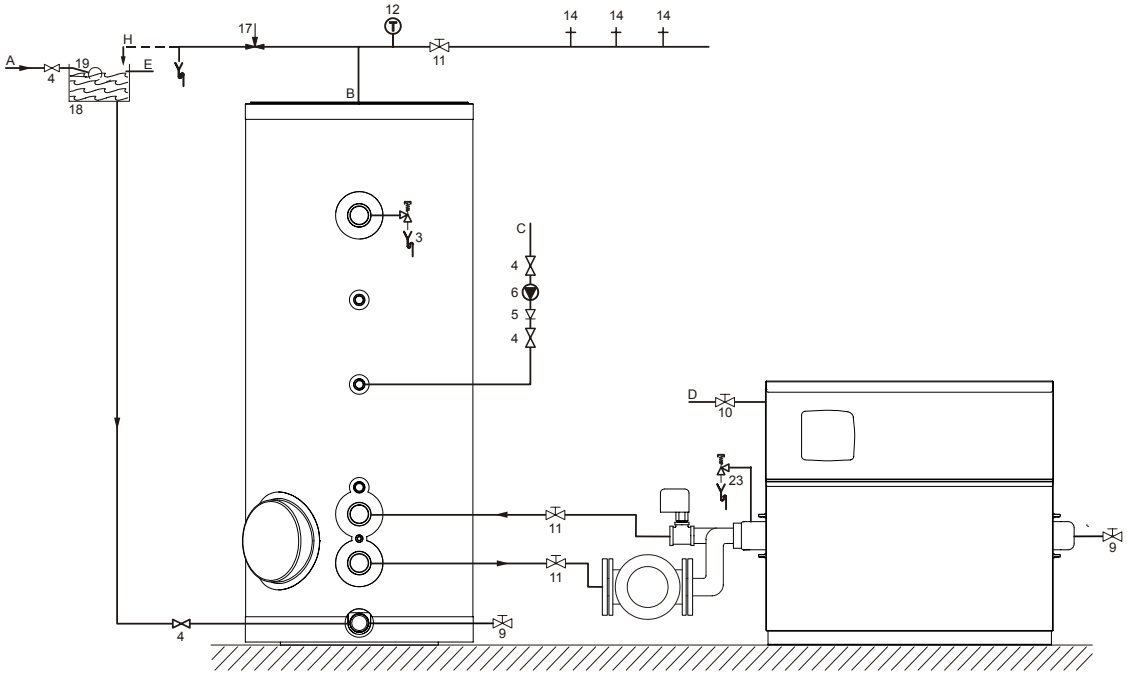
Vented



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Legend

Only applicable numbers are mentioned.

1. pressure-reducing valve (mandatory if the mains water pressure exceeds 8 bar)
2. inlet combination (mandatory)
3. expansion valve
4. stop valve (recommended)
5. non-return valve (mandatory)
6. circulation pump (optional)
9. drain valve
10. manual gas valve (mandatory)
11. service stop valve
12. temperature gauge (recommended)
14. hot water draw-off points
15. expansion valve (mandatory)
16. expansion vessel (mandatory)
18. water tank
19. float valve
23. P-valve

A. cold water supply
B. hot water supply
C. circulation pipe
D. gas supply
E. overflow pipe
H. overflow safety

3.6 Water connections, Vented

Warning
The installation should be carried out by an authorised installation engineer, in compliance with general and local regulations (1.3 "Regulations").

3.6.1 Cold water side

See (A) in the installation diagram (3.5 "Installation diagram").

1. Fit an approved stop valve (4) on the cold water side between the cold water head tank (18) and the appliance, as required by regulations (1.3 "Regulations").

3.6.2 Hot water side

See (B) in the installation diagram (3.5 "Installation diagram").

Note
Insulating long hot water pipes prevents unnecessary energy loss.

1. Fit the T&P valve (3).
2. Optional: fit a temperature gauge (12) so you can check the temperature of the tap water.
3. Fit a stop valve (11) in the hot water outlet pipe for servicing.
4. If a circulation pipe is required, continue by installing the circulation pipe (3.6.3 "Circulation pipe").

3.6.3 Circulation pipe

See (C) in the installation diagram (3.5 "Installation diagram").

If an immediate flow of hot water is required at draw-off points, a circulation pump can be installed. This improves comfort and reduces water wastage.

1. Fit a circulation pump (6) of the correct capacity for the length and resistance of the circulation system.
2. Fit a non-return valve (5) behind the circulation pump to guarantee the direction of circulation.
3. Fit two stop valves for service purposes (4).
4. Connect the circulation pipe up to a connection of the storage tank.

3.6.4 System pump

The pump revs can be set using an adjuster unit. This setting depends on the length of the pipes X between the storage tank and the appliance.

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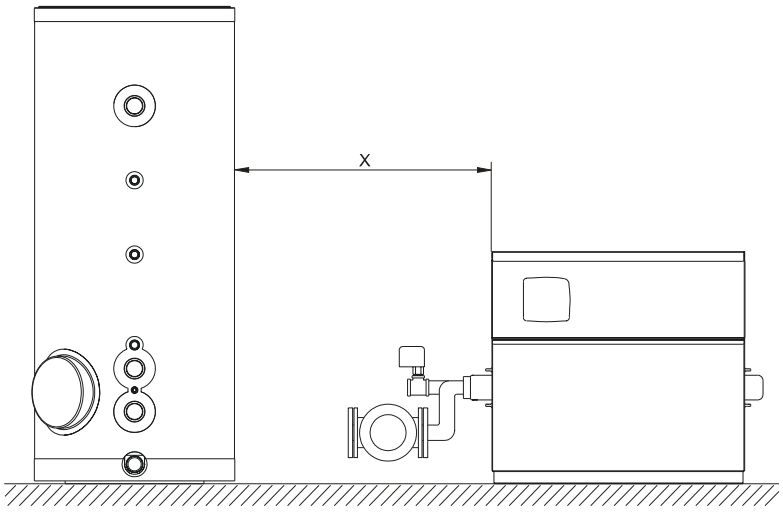
Distance X

		GWV 120	GWV 150	GWV 200
Pipe diameter		Ø 42 (1 $^{1}/_{2}$")	Ø 54 (2")	Ø 54 (2")

Distance X



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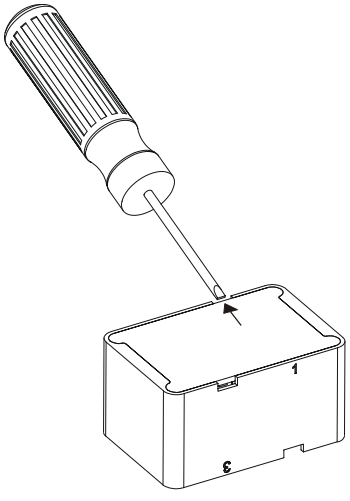
- 0 < X < 2 metres, rev setting 1
- 2 < X < 4 metres, rev setting 2
- 4 < X < 6 metres, rev setting 3

You set the revs using the pump's adjuster unit. Proceed as follows:

1. Unscrew the pump's cap.
2. The pump's adjuster unit can be seen.
3. Take the adjuster unit out.
4. Remove the cap of the adjuster unit.



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5. Turn the adjuster unit so that the number of the rev setting required can be seen.

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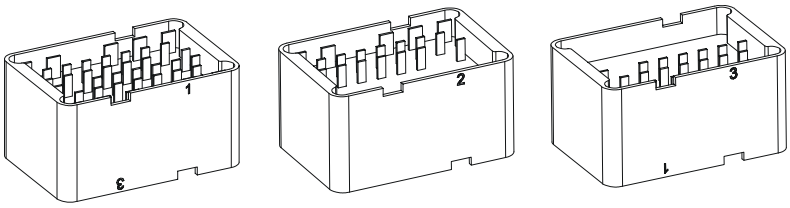

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6. Put the cap back on the adjuster unit.
7. Insert the adjuster unit back in the pump.
8. Fit the cap back on the pump.

3.7 Water connections, Unvented

Warning
The installation should be carried out by an authorised installation engineer, in compliance with general and local regulations (1.3 "Regulations").

3.7.1 Cold water side

See (A) in the installation diagram (3.5 "Installation diagram").

1. Fit an approved stop valve (4) on the cold water side as required by applicable regulations (1.3 "Regulations").
2. The maximum working pressure of the appliance is 8 bar. Because the pressure in the water pipe at times can exceed 8 bar, you must fit an approved pressure-reducing valve (1).
3. Fit a non-return valve (5) and an expansion vessel (16).
4. Fit an expansion valve (15) and connect the overflow side to an open wastewater pipe.

3.7.2 Hot water side

See (B) in the installation diagram (3.5 "Installation diagram").

Note
Insulating long hot water pipes will prevent unnecessary energy loss.

1. Optional: fit a temperature gauge (12) so you can check the temperature of the tap water.
2. Fit the T&P valve (3).
3. Fit a stop valve (11) in the hot water outlet pipe for servicing.

3.7.3 Circulation pipe

See (C) in the installation diagram (3.5 "Installation diagram").

If an immediate flow of hot water is required at draw-off points, a circulation pump can be installed. This improves comfort and reduces water wastage.

1. Fit a circulation pump (6) of the correct capacity for the length and resistance of the circulation system.
2. Fit a non-return valve (5) behind the circulation pump to guarantee the direction of circulation.
3. Fit two stop valves for service purposes (4).
4. Connect the circulation pipe up to a connection of the storage tank

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3.8 Gas connection

Warning
The installation should be carried out by an authorised installation engineer, in compliance with general and local regulations (1.3 "Regulations").

Caution
Make sure that the diameter and length of the gas supply pipe are large enough to supply sufficient capacity to the appliance.

See (D) in the installation diagram (3.5 "Installation diagram").

1. Fit a manual gas valve (10) in the gas supply pipe.
2. Blow the gas pipe clean before use.
3. Close the gas system.
4. Fit the gas supply pipe to the gas system.

Warning
After fitting, check for leaks.

3.9 Air supply and flue

3.9.1 Introduction

This section covers the following subjects:

- Requirements for flue gas discharge materials
- Parallel connections
- Specifications

3.9.2 Requirements for flue gas discharge materials

Warning
Installation must be carried out by an authorised installation engineer, in compliance with general and local regulations (1.3 "Regulations").

Types of appliances

The appliances are approved for appliance types C13, C33 and B23. The figure and table give information about appliance types C13 and C33. For an explanation of the possibilities, please contact the manufacturer.

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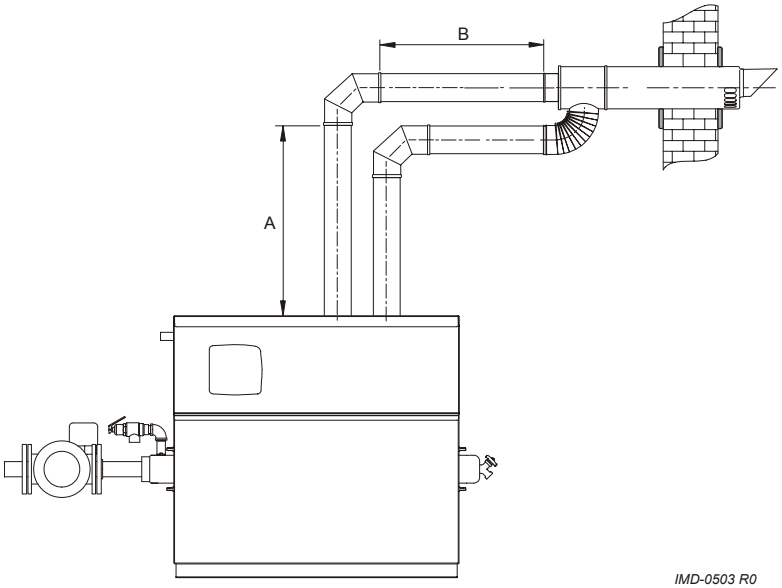
C13: appliance with wall conduit



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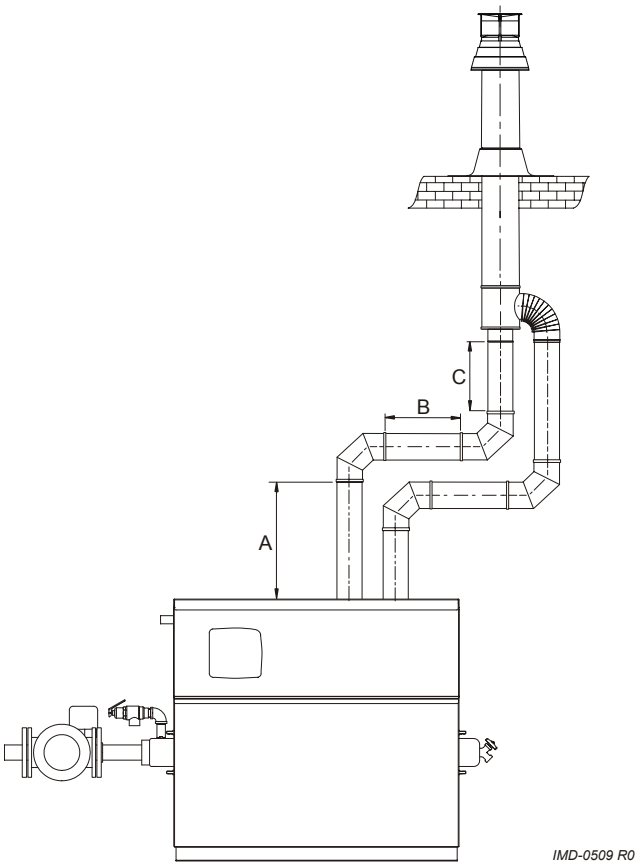
C33: appliance with roof conduit



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Note
Make sure that the chimney discharges into an area where this is permitted for this category of appliance.

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3.9.3 Parallel connections

The air supply duct and flue gas outlet duct for the GWV 120, 150 and 200 exit the appliance separately. They must be connected (3.9.2 "Requirements for flue gas discharge materials") to the concentric wall conduit or roof conduit using a transition piece.

The following requirements must also be fulfilled:

- The maximum allowed chimney length (A+B (C)) has the following dimensions:
  - 8 metres of uninsulated pipe including 2 bends;
  - 20 metres of uninsulated pipe including 2 bends. With a condensation outlet in the flue gas outlet, within 8 metres of the appliance;
  - 20 metres of insulated pipe including 2 bends;

Caution
Contact the supplier for the installation of an insulated pipe.

- maximum number of 45° or 90° bends allowed is 2.
- If you make use of horizontal piping, then this must slope towards the appliance at a minimum of 5 mm per metre running length!
- The transition piece to convert the air supply and flue gas discharge from parallel to concentric must be placed immediately before the roof or wall flue terminal.
- The duct length of the air supply must be approximately the same as that of the flue gas discharge chimney. Make sure that the chimney discharges into an area where this is permitted for this type of appliance.

3.9.4 Specifications

Note
For C13 and C33-category appliances, we prescribe the use of a roof or wall conduit approved for the appliance. Use of an incorrect roof or wall flue conduit can cause the installation to malfunction.

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Specifications for transition piece and concentric wall flue terminal (C13)

Subject		Description
Wall flue terminal set: • 1x wall flue terminal (incl. transition piece) • 1x wall plate • 1x clamping ring • 2x pipe, 500mm • 3x bend, 90°	Item No.	GWV 120: 0308 241 [1] GWV 150: 0308 241 [1] GWV 200: 0308 242 [1]
	Construction	Concentric
	Manufacturer	Muelink & Grol
	Type	GWV 120: M2000 MDV SE 150 GWV 150: M2000 MDV SE 150 GWV 200: M2000 MDV SE 200
Pipe material	Construction	Parallel
	Flue gas discharge	Thick-walled aluminium with lipped sealing ring
	Air supply	Thick-walled aluminium with lipped sealing ring
Pipe diameters	Flue gas discharge	GWV 120: Ø 150 mm GWV 150: Ø 150 mm GWV 200: Ø 200 mm
	Air supply	GWV 120: Ø 150 mm GWV 150: Ø 150 mm GWV 200: Ø 200 mm
[1] No other wall flue terminal is permitted. Use this item number to order the wall conduit set from *supplier,* manufacturer or wholesaler.		

Specifications for transition piece and concentric roof conduit (C33)

Subject		Description
Roof flue terminal set: • 1x roof flue terminal (incl. transition piece) • 1x adhesive sheet • 1x clamping ring • 2x pipe, 1000 mm • 1x bend, 90°	Item No.	GWV 120: 0308 239 [1] GWV 150: 0308 239 [1] GWV 200: 0308 240 [1]
	Construction	Concentric
	Manufacturer	Muelink & Grol
	Type	GWV 120: DDV-VR 150/150-150/220 GWV 150: DDV-VR 150/150-150/220 GWV 200: DDV-VR 200/200-200/300
Pipe material	Construction	Parallel
	Flue gas discharge	Thick-walled aluminium with lipped sealing ring
	Air supply	Thick-walled aluminium with lipped sealing ring
Pipe diameters	Flue gas discharge	GWV 120: Ø 150 mm GWV 150: Ø 150 mm GWV 200: Ø 200 mm
	Air supply	GWV 120: Ø 150 mm GWV 150: Ø 150 mm GWV 200: Ø 200 mm
[1] No other wall flue terminal is permitted. Use this item number to order the wall conduit set from *supplier,* manufacturer or wholesaler.		

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Specification of condensation outlet for uninsulated lengths greater than 8 metres and no more than 20 metres

Subject		Description
Condensation outlet set • 1x clamping ring • 1x trap • 2x pipe Ø 32x500 mm • 2x bend, Ø 32 90°	Item No.	GWV 120: 0308 278 GWV 150: 0308 278 GWV 200: 0308 279
	Construction	n/a
	Manufacturer	Muelink & Grol
	Type	n/a
Pipe material	Construction	Parallel
	Outlet	Thick-walled aluminium with lipped sealing ring
Pipe diameters	Outlet	GWV 120: Ø 150 mm GWV 150: Ø 150 mm GWV 200: Ø 200 mm

3.10 Electrical connection

Warning
The installation should be carried out by an authorised installation engineer, in compliance with general and local regulations (1.3 "Regulations").

3.10.1 Introduction

Topics covered in this paragraph, in sequence:

- Preparation;
- Connecting the mains voltage;

A program-controlled pump, and external on/off switch and an alarm can optionally be fitted to the appliance. For these options, see:

- Connecting a program-controlled pump;
- Connecting an external on/off switch;
- Connecting an alarm signal ('Alarm OUT');
- Sensor wiring

Note
The optional components are not included in the rating for electrical power consumption stated in the table (3.4.2 "General and electrical specifications").

3.10.2 Preparation

Caution
The appliance is phase-sensitive. It is **absolutely essential** to connect the mains live (L) to the live of the appliance, and the mains neutral (N) to the neutral of the appliance.

The figure shows a view of the electrical connector block, and the table shows the appropriate connections.

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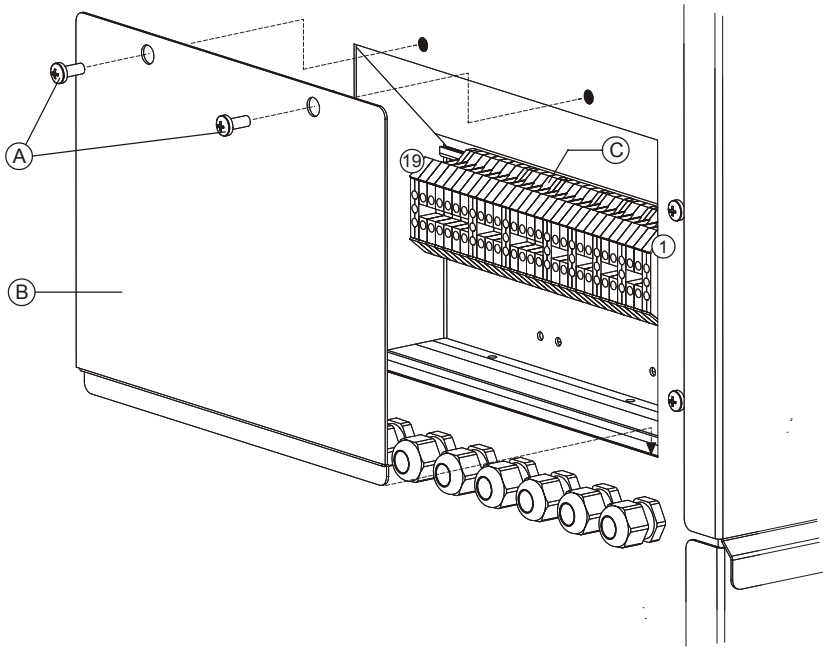
Connector block

Legend

A. screws
B. protector plate
C. connector block



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As part of the preparations, you should first remove the protective plate from the electrical section.

1. Loosen the 2 screws (A) of the electrical section, and remove the protective cap (B) from the electrical section.
   The connector block (C) is now visible.

Note
Consult the table for the connections and consult the electrical diagram for the electrical component connections.

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Electrical connector block

19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
⏚	X_7	X_6	X_5	X_4	⏚	X_3	X_2	⏚	X_1	N	L_2	⏚	N	L_1	⏚	N	L	⏚

Terminal	Name	Function
19	⏚	**Earth connection**
18	X_7	**External on/off switch**
17	X_6	
16	X_5	**n/a**
15	X_4	**n/a**
14	⏚	**Earth connection**
13	X_3	**Alarm signal**
12	X_2	
11	⏚	**Earth connection**
10	X_1	**n/a**
9	N	**Program-controlled pump**
8	L_2	
7	⏚	
6	N	**System pump**
5	L_1	
4	⏚	
3	N	**Mains voltage (230VAC-50Hz)**
2	L	
1	⏚	

3.10.3 Connecting the mains voltage

The appliance is supplied without a power cable and isolator.

Note
To provide the appliance with voltage, the appliance must be permanently connected to the mains voltage. A double-pole isolator with a contact gap of at least 3 mm must be fitted between this permanent connection and the appliance. The power cable must have cores of at least 3 x 1.0 mm^2.

Warning
Leave the appliance isolated until you are ready to start it up.

1. Pass the power cable through the right-hand strain relief.
2. Connect the cable to terminals 1-2-3 of the DIN rail.
3. Connect the power cable to the double-pole isolator.
4. If you do not need to make any more connections:
   - Fit the protector plate onto the electrical connector block.

3.10.4 Connecting a program-controlled pump

1. Pass the cable through the third strain relief from the right.
2. Connect the cable to terminals 7-8-9 of the DIN rail.
3. Connect the wire up to the pump.

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4. If you do not need to make any more connections:
   - Fit the protector plate onto the electrical connector block.

3.10.5 Connecting an external on/off switch

There is an option for connecting an external ON/OFF switch. In the OFF position, the programmed operating state is active. In the ON position, the programmed operating mode is overruled, and the "ON mode" is active.

1. Pass the power cable through the left-hand strain relief.
2. Connect the cables (X_7 and X_6) to terminals 17 and 18 according to the table (3.10.2 "Preparation").
3. Connect the wires up to the external switch.
4. If you do not need to make any more connections:
   - Fit the protector plate onto the electrical connector block.

3.10.6 Connecting an alarm signal ('Alarm OUT')

Alarm OUT is a potential free terminal that is switched when an error is detected. This can be used to signal errors, for example with a bulb. A 230V circuit can be powered directly. For other voltages, a specific relay prescribed by AO Smith is required.

1. Pass the lead through the strain relief.
2. Connect the phase cables (X_2 and X_3) up to terminals 12 and 13 according to the table on page 34. If required, connect earth (⏚) to terminal 11.
3. Connect the wires up to the fault sensor.
4. If you do not need to make any more connections:
   - Fit the protector plate onto the electrical connector block.

3.10.7 Sensor wiring

Four connectors are fitted to the left-hand side of the appliance. These connectors connect four components up to the electronic controller. From top to bottom, these are:

- Flow-through switch
- Storage tank
- Cold water in
- Hot water out

The wiring to these components is assembled in the factory. Only the wire to the storage tank still needs connecting up to the sensor.

3.11 Checking the supply pressure and burner pressure

Note
Before starting the appliance and/or checking the supply pressure and burner pressure, you must fill (5 "Filling") the appliance.

Caution
Before starting up for the first time or after conversion, you must always check the supply pressure and burner pressure.

Note
The easiest way to check the gas pressures is by using two pressure gauges. This procedure assumes that these two gauges are available.

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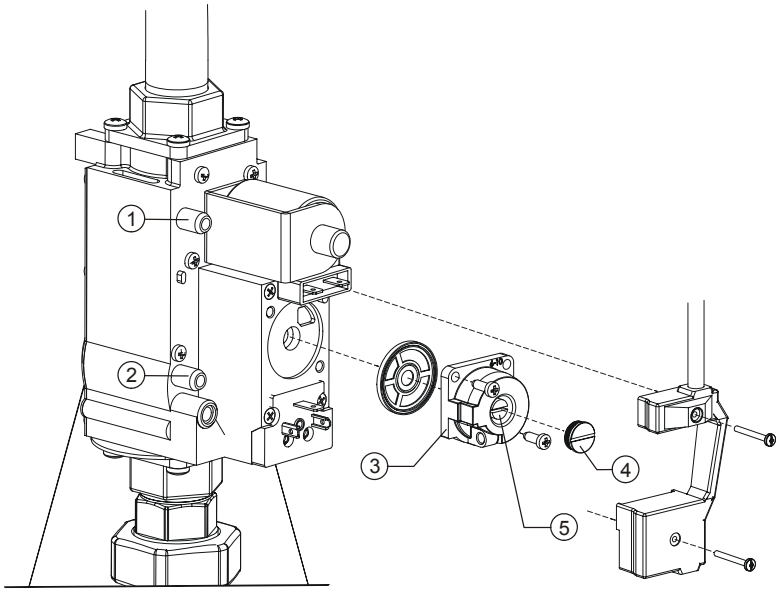
Gas control

Legend

Only applicable numbers are mentioned.

1. supply pressure test nipple
2. burner pressure test nipple
3. burner pressure regulator
4. burner pressure control cap
5. burner pressure control adjusting screw



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3.11.1 Preparation

To check the supply pressure and burner pressure, proceed as follows:

1. Isolate (10.3 "Isolating the appliance from the mains") the appliance from the power supply.
2. Undo the screws of the front cover.

3.11.2 Procedure for checking pressures

1. There are two test nipples on both gas controls:
   - a supply pressure nipple (1)
   - a burner pressure nipple (2)

   Sealing screws are located inside the test nipples. Loosen both sealing screws by a few turns. Do no completely undo them, as it may be awkward retightening them.
2. Connect a pressure gauge to the burner pressure nipple (2).
3. Open the gas supply and vent the gas supply line through the supply pressure nipple (1).
4. Connect a pressure gauge to the supply pressure nipple (1) when gas starts to flow from this nipple.
5. Switch on the power to the appliance using the isolator on the appliance.
6. Switch the electronic controller **ON** by setting the 0/I switch to **position I**.

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IMD-0511 R1

The display will now show INTERNAL CHECK for about 10 seconds and go to the main menu.

```
   INTERNAL CHECK
```

```
MENU
 →OFF
▲ ON
▼ WEEK PROGRAM
```

7. Activate the "ON mode" by going through the following steps:
   - Press the blue arrow once (🡻) to position the cursor in front of ON and press ENTER. The display shown here will appear.

```
→START OPERATION
▲ CHANGE SETPOINT
▼          Tset=65C
```

   - Confirm the START OPERATION by pressing ENTER.

   The appliance is now in the "ON mode" and will ignite.
8. When the display shows the text RUNNING 2, you must wait about 1 minute before reading the dynamic pressures (the fan needs this time to run up to full rotational speed).
9. Use the pressure gauge to read the supply pressure at the test nipple (1) (3.4.3 "Gas data").

Note
Consult the mains gas supply company if the supply pressure is not correct.

10. Use the pressure gauge to read the burner pressure at nipple (2) (3.4.3 "Gas data").

If the burner pressure is not correct, you can adjust the pressure according to the procedure (3.11.3 "Adjusting the pressure").

3.11.3 Adjusting the pressure

1. Remove the cap (4) from the burner pressure regulator (3).
2. Correct the burner pressure by turning the adjusting screw (5), depending on the correction required:
   - Adjustment screw anticlockwise: burner pressure decreases.
   - Adjustment screw clockwise: burner pressure increases.

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3. Cover the opening of the adjusting screw and check the burner pressure against the value given in the gas table (3.4.3 "Gas data").
4. If the pressure is not set correctly, repeat the preceding steps until the correct pressure is attained.
5. Fit the cap (4) back on the burner pressure regulator.
6. Activate the "OFF mode" of the electronic controller:

7. If the MENU is not displayed:
   press .
   - Use ↑ and ↓ to place the cursor beside OFF.
   - Confirm with ENTER.
8. Wait until the fan has stopped, and switch the electronic controller off.

Caution
Failure to wait until the fan stops can cause damage to the appliance.

9. Finish off (3.11.4 "Finalising").

3.11.4 Finalising

1. Shut off the gas supply.
2. Disconnect the two pressure gauges and retighten the sealing screws in the test nipples in the gas controls.
3. Put the front panel back.

Note
Before starting the appliance up, take time to fill in the warranty card supplied with the appliance. This enables us to guarantee the quality of our systems, and to further enhance our warranty procedure.

Please return this card as soon as possible. Your customer will then receive a warranty certificate with our warranty conditions.

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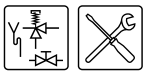

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4 Conversion to a different gas category

Caution
The conversion may only by carried out by an authorised installation engineer.

If the appliance must operate on a family of gases (LP gas or natural gas) or other gas category than that for which the appliance has been set at the factory, the appliance will have be adapted using a special conversion kit.

Caution
You must check the supply pressure and burner pressure once the conversion is complete.

The conversion instructions are not part of this manual.

Contact A.O. Smith if conversion is needed.

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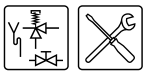

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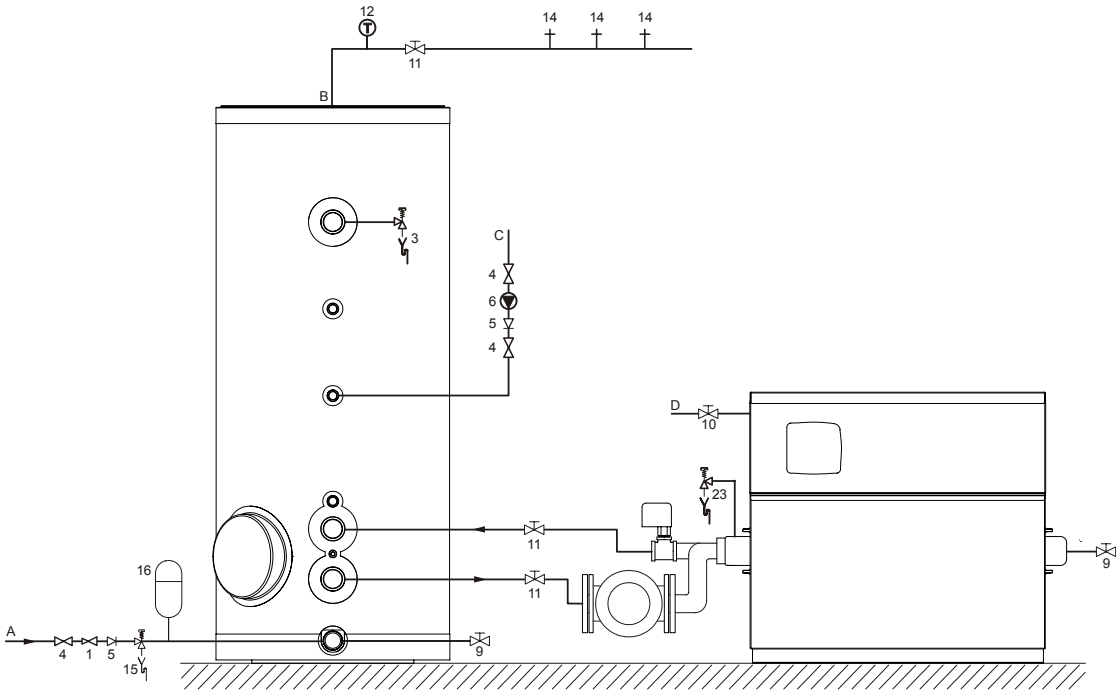
5 Filling

5.1 Installation diagram

This figure shows the installation diagram. This diagram is used in the sections in which the actual connection process is described.

Installation diagram

Unvented



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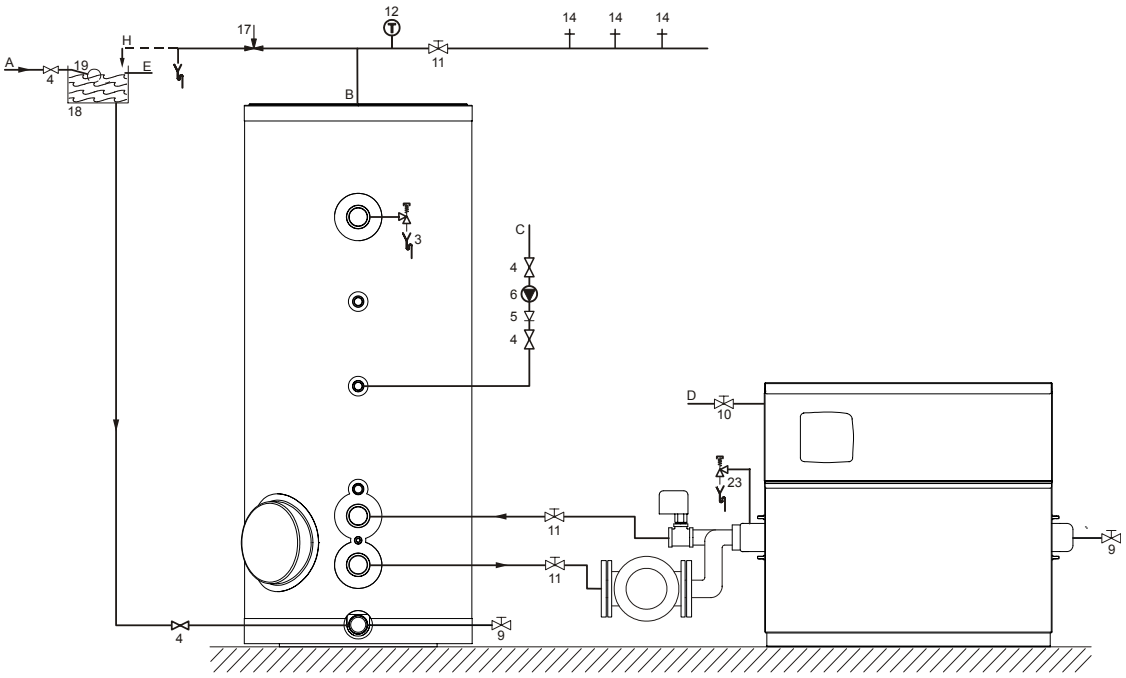
Vented



IMD-0487 R2

Legend

Only applicable numbers are mentioned.

1. pressure-reducing valve (mandatory if the mains water pressure exceeds 8 bar)
2. inlet combination (mandatory)
3. expansion valve
4. stop valve (recommended)
5. non-return valve (mandatory)
6. circulation pump (optional)
9. drain valve
10. manual gas valve (mandatory)
11. service stop valve
12. temperature gauge (recommended)
14. hot water draw-off points
15. expansion valve (mandatory)
16. expansion vessel (mandatory)
18. water tank
19. float valve
23. P-valve

A. cold water supply
B. hot water supply
C. circulation pipe
D. gas supply
E. overflow pipe
H. overflow safety

5.2 Filling unvented installations

To fill the appliance, proceed as follows:

1. Open the stop valve (11) in the hot water pipe and, if present, the stop valves (4) for the circulation pump (6).
2. Close the drain valve (9).
3. Open the nearest hot water draw-off point (14).
4. Open the stop valves (11) between the storage tank and the appliance.
5. Open the stop valve (4) on the cold water side (A) so that cold water flows into the appliance.
6. Completely fill the appliance. When a full water jet flows from the nearest draw-off point, the appliance is full.
7. Bleed the entire installation of air, for example by opening all draw-off points.
8. Bleed the pump.

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9. The appliance is now under water supply pressure. There should be no water coming out of the expansion valve (15) or out of the P-valve (23). If there is, the cause might be:
   - The water supply pressure is greater than the specified 8 bar. Rectify this by fitting a pressure reducing valve (1).
   - The expansion valve in the protected cold supply setup is defective or incorrectly fitted.

5.3 Filling vented installations

To fill the appliance, proceed as follows:

1. Open the stop valve (11) in the hot water pipe and, if present, the stop valves (4) for the circulation pump (6).
2. Close the drain valve (9).
3. Open the nearest hot water draw-off point (14).
4. Open the stop valves (11) between the storage tank and the appliance.
5. Open the stop valve (4) on the cold water side (A) so that cold water flows into the appliance.
6. Completely fill the appliance. When a full water jet flows from the nearest draw-off point, the appliance is full.
7. Bleed the entire installation of air, for example by opening all draw-off points.
8. Bleed the pump.
9. The appliance is now under water supply pressure. There should be no water coming out of the P-valve (23). If this does happen, the P-valve might be defective or incorrectly fitted.

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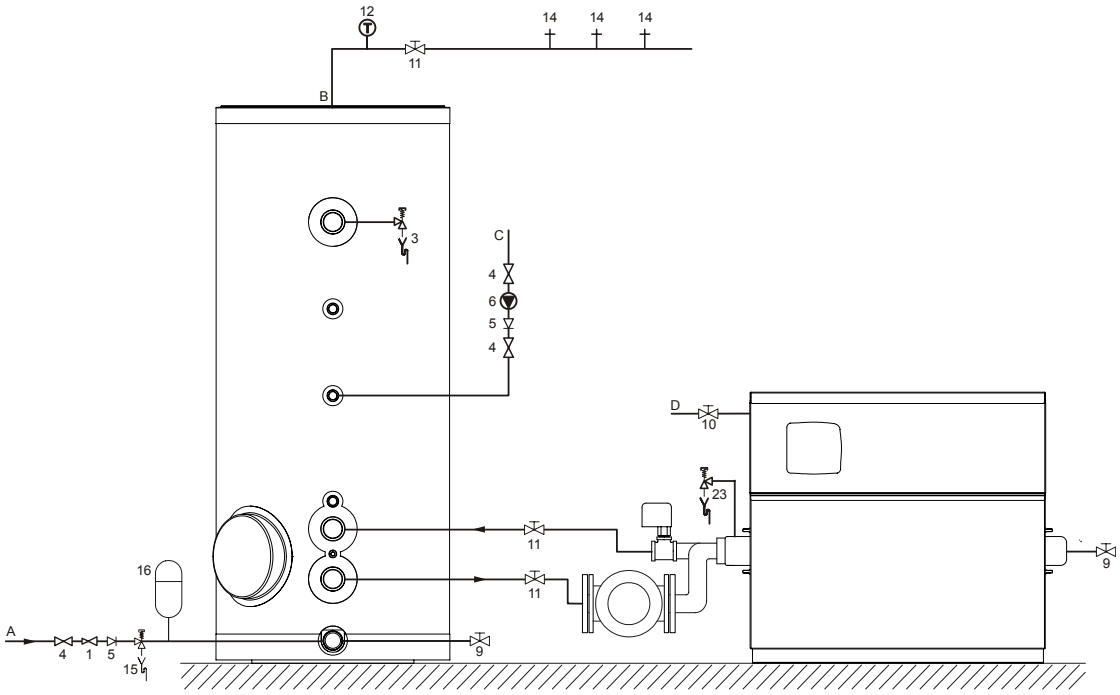
6 Draining

6.1 Installation diagram

This figure shows the installation diagram. This diagram is used in the sections in which the actual connection process is described.

Installation diagram

Unvented



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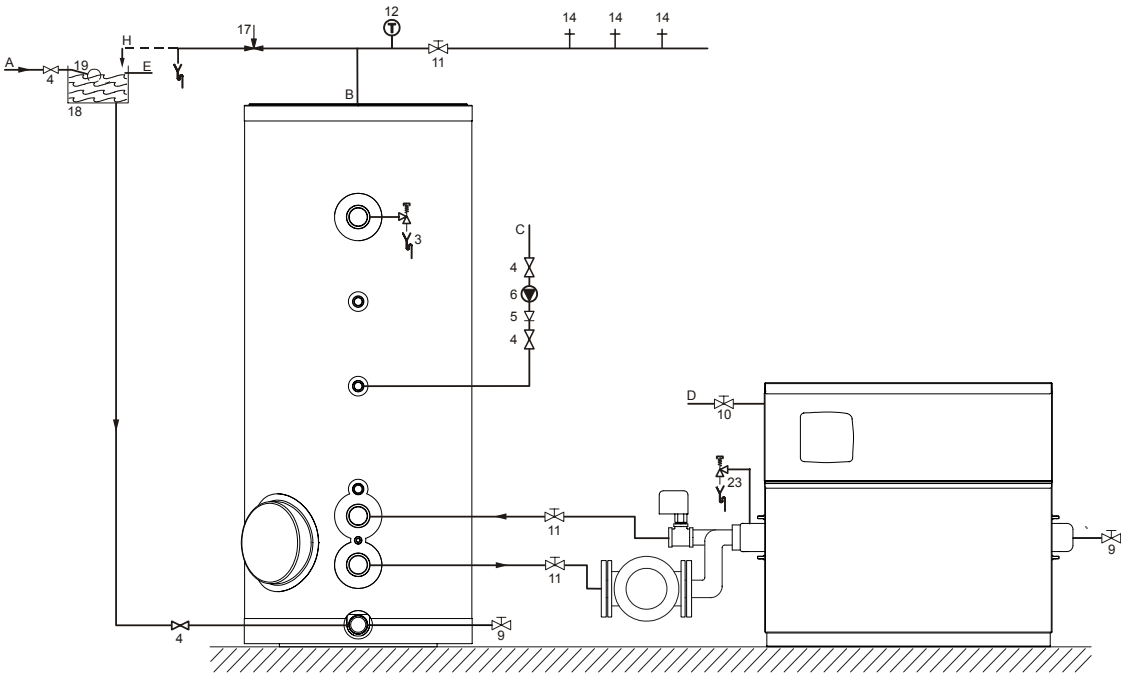
Vented



IMD-0487 R2

Legend

Only applicable numbers are mentioned.

1. pressure-reducing valve (mandatory if the mains water pressure exceeds 8 bar)
2. inlet combination (mandatory)
3. expansion valve
4. stop valve (recommended)
5. non-return valve (mandatory)
6. circulation pump (optional)
9. drain valve
10. manual gas valve (mandatory)
11. service stop valve
12. temperature gauge (recommended)
14. hot water draw-off points
15. expansion valve (mandatory)
16. expansion vessel (mandatory)
18. water tank
19. float valve
23. P-valve

A. cold water supply
B. hot water supply
C. circulation pipe
D. gas supply
E. overflow pipe
H. overflow safety

6.2 Draining unvented installations

Some service activities require the appliance to be drained. The procedure is as follows:

1. Activate the MENU with .

2. Position the cursor in front of OFF.
3. Confirm OFF with ENTER.
4. Wait until the fan has stopped. The symbol is then dimmed.

Caution
Failure to wait until the fan stops purging can cause damage to the appliance.

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5. Switch the appliance OFF (position 0) using the ON/OFF switch on the control panel.

IMD-0511 R1

6. Isolate the water heater from the power supply by putting the isolator between the appliance and the mains power supply to position 0.
7. Shut off the gas supply (10).
8. Close the stop valve (11) in the hot water pipe.
9. Close the supply valve (4) in the cold water supply (A).
10. Open the drain valve (9).
11. Bleed the appliance (or installation) so that it drains completely.

6.3 Draining vented installations

Some service activities require the appliance to be drained. The procedure is as follows:

1. Activate the MENU with ⌓.
2. Position the cursor in front of OFF.
3. Confirm OFF with ENTER.
4. Wait until the fan has stopped. The symbol is then dimmed.

Caution
Failure to wait until the fan stops purging can cause damage to the appliance.

5. Switch the appliance OFF (position 0) using the ON/OFF switch on the control panel.

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6. Isolate the water heater from the power supply by putting the isolator between the appliance and the mains power supply to position 0.
7. Shut off the gas supply (10).
8. Close the stop valve (11) in the hot water pipe.

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9. Close the stop valve (4) between the water tank and the cold water inlet (A).
10. Open the drain valve (9).
11. Bleed the appliance (or installation) so that it drains completely.

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7 The control panel

7.1 Introduction

Topics covered in this chapter:

- Operation;
- Meaning of icons;
- Electronic controller ON/OFF switch;
- Navigation buttons;
- PC connection.

7.2 Operation

The entire appliance is controlled and monitored by the ThermoControl (the electronic control).The figure shows the electronic controller.

IMD-0511 R1

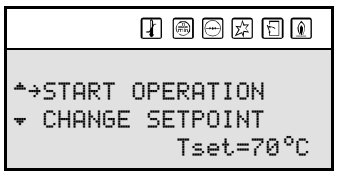
The control panel is completely menu-driven, and comprises:

- a 4-line display with 20 characters per line;
- 6 pushbuttons for operating the appliance (below the display);
- 6 graphical symbols (above the display);
- a connector for a service PC;
- an ON/OFF switch.

The pushbuttons are divided into three groups:

- Navigation buttons:
  - Buttons for UP ↑, and DOWN ↓;
  - Enter: ENTER;
  - Reset button: RESET
- The main menu (11 "Main menu"): ;
- the service program (12 "Service program"): . This chapter is specifically intended for the service and maintenance engineer and installation engineer.

In this manual, the display of the electronic controller is shown as in the figure, both with and without icons.



7.3 Meaning of icons

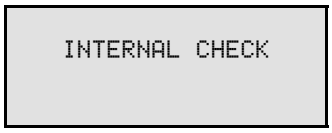
The table explains the meanings of the icons.

Icons and their meaning

	Name	Meaning
	Heat demand	Heat demand detected
	Purge	Pre- and post-purge using fan
	Pressure switch	Pressure switch is closed
	Glowing	(Pre)glow
	Gas control	Gas control open/ignition
	Flame detection	Appliance operational

7.4 Electronic controller ON/OFF switch

The ON/OFF switch of the electronic controller is used to switch the appliance ON and OFF.



After switching on, the text INTERNAL CHECK appears on the display for about 10 seconds. Themain menu (11 "Main menu") then appears. If no selection is made in the main menu, the appliance automatically switches to the OFF mode (8.2 "Operating modes").

Note
To isolate the appliance electrically, you must use the isolator between the appliance and the mains power supply.

7.5 Navigation buttons

The use of these buttons is explained with the help of the figure that shows the main menu (11 "Main menu").

The navigation buttons are:

- Buttons for UP ↑, and DOWN ↓;
- Enter: ENTER;
- Reset button: RESET.

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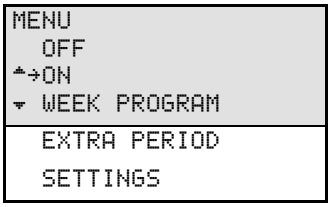
The ▲ and ▼ indicate that you can scroll up and/or down. Use the ↑ and ↓buttons to scroll.



The cursor → points to the option to be activated. In the display as shown in the figure, you can scroll through the main menu.

The main menu comprises: OFF, ON, WEEK PROGRAM, EXTRA PERIOD and SETTINGS. You have to scroll down further to see the EXTRA PERIOD and SETTINGS texts.

Press ENTER to confirm the selected option.

With the RESET button, you go back one page in a menu and all options selected in the current menu are discarded.

Note
The RESET button is also used to reset the appliance after a fault.

7.6 PC connection

The PC connection is solely intended to enable technicians from A.O. Smith to display the status and history of the appliance. These details can be important for troubleshooting and/or responding to complaints.

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8 Status of the appliance

8.1 Introduction

Topics covered in this chapter, in sequence:

- Operating modes
- Error conditions
- Service condition
- Warning

8.2 Operating modes

When running, the appliance has four basic operating modes, namely:

- OFF
- ON
- PROG
- EXTRA

8.2.1 OFF

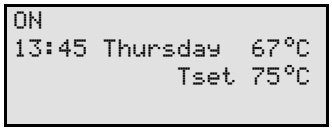
In this mode, the frost protection is activated. The figure shows the display with the following information:

- line one: the text OFF
- line two: the time, the day and T_3
- lines three and four: the text FROST PROTECTION ACTIVATED.

8.2.2 ON

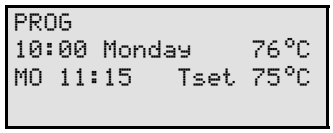
In this mode, the appliance continually responds to the hot water demand. The figure shows the display with the following information:

- line one: the text ON;
- line two: the time, the day and T_1 and T_3 alternately (2.3 "The appliance's heating cycle").
- line three: the programmed water temperature T_{set};
- line four: is empty when the appliance is idle, or depending on the heating cycle (2.3 "The appliance's heating cycle"), displays a text such as HEAT DEMAND.



8.2.3 PROG

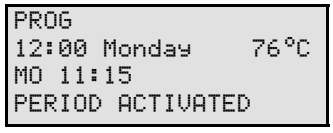
In this mode a preset week program is active, and the appliance responds continually to demand within the time periods set in the week program. There are two distinct situations possible in this mode:



1. **The current time falls within a set time period of the week program.**

   The figure shows the display with the following information:

   - line one: the text PROG;
   - line two: the time, the day and T_1 and T_3 alternately (2.3 "The appliance's heating cycle");
   - line three: the next scheduled switch-off time and the water temperature $_{Tset}$ of the active period;
   - line four: is empty when the appliance is idle, or depending on the heating cycle (2.3 "The appliance's heating cycle"), displays a text such as HEAT DEMAND.



2. **The current time falls outside a set time period of the week program.**

   The figure shows the display with the following information:

   - line one: the text PROG;
   - line two: the time, the day and T_3 alternately (2.3 "The appliance's heating cycle");
   - line three: the next scheduled switch-on time;
   - line four: displays the text PERIOD ACTIVATED.

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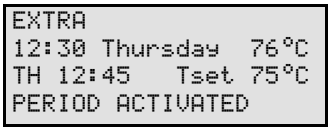
In all modes, the temperature may at any moment drop below the desired temperature. The appliance then enters a heating cycle. This heating cycle is identical (2.3 "The appliance's heating cycle") for all basic operating modes.

Note
Setting and programming the basic operating modes is described in the chapter on the Main menu (11 "Main menu").

8.2.4 EXTRA

In this mode, a single extra period is programmed and activated. In this mode, the PROG and ON modes are temporarily overruled to meet a single period of heat demand. When the period has passed, the appliance automatically returns to the previous operating mode. The figure shows the display with the following information:

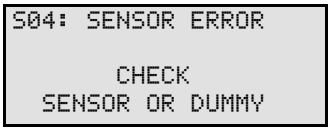
- line one: the text EXTRA;
- line two: the time, the day and T_1 and T_3 alternately (2.3 "The appliance's heating cycle");
- line three: the switch-on or switch-off time and the related water temperature setting;
- line four: the text PERIOD ACTIVATED.



8.3 Error conditions

The figure shows an example of an error condition. If the appliance enters this condition, the display will show the following information:

- line one: error code comprising a letter and two digits, followed by the error description;
- lines two to four: alternately, a brief explanation of the error, and a brief action to resolve the error.



Caution
The displayed action to resolve the error may only be performed by a service and maintenance engineer.

There are various types of errors:

- LOCK OUT ERRORS

  When the cause has been removed, these errors require a reset with the RESET button before the appliance can resume operation.
- BLOCKING ERRORS

  These errors disappear automatically once the cause of the error has been removed, after which the appliance resumes operation by itself.

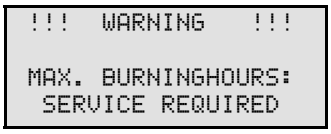
The display does not show what type of error has been detected. A comprehensive overview of the errors is provided elsewhere in the manual (13 "Troubleshooting").

If, as end-user, you find the appliance in an error condition, you may attempt to restart the appliance by pressing the RESET button once.

However, if the error returns or occurs several times in a short time, you must contact your service and maintenance engineer.

8.4 Service condition

The figure shows the message

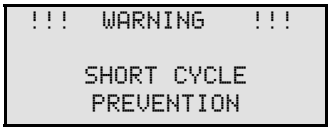


SERVICE REQUIRED. Should this message appear, then the appliance is in need of a service and maintenance inspection. In that case, contact your service and maintenance engineer.

Note
The message SERVICE REQUIRED is based on the number of expired burning hours and the preset service interval. Should the service interval have been incorrectly selected, contact the service and maintenance engineer for instructions on how to adjust this. Information on the maintenance frequency is provided elsewhere in the manual (14 "Maintenance frequency").

8.5 Warning

The figure shows the message:



The appliance will continue to run under partial load. Explanations of the warnings are provided elsewhere in the manual (13 "Troubleshooting").

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9 Starting and running

9.1 Introduction

Topics covered in this chapter, in sequence:

- Starting and running.
- The appliance's heating cycle.

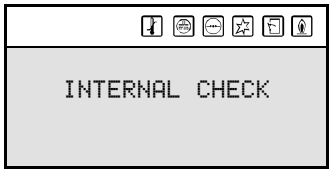
9.2 Starting and running

Start the appliance as follows:

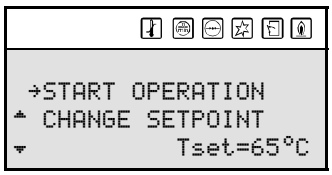
1. Fill the appliance (5 "Filling").
2. Open (3.5 "Installation diagram") the manual gas valve.
3. Switch on the power to the appliance using the isolator between the appliance and the power supply.
4. Switch the electronic controller **ON** by setting the ON/OFF switch to **position I**.

IMD-0511 R1

The display will now show INTERNAL CHECK for about 10 seconds and go to the main menu.



5. Press the blue arrow once (🡻) to position the cursor in front of ON and press ENTER. The display shown in the figure will appear.



6. Confirm the START OPERATION by pressing ENTER.

   The appliance is now in "ON mode". If there is a heat demand, the appliance will run through the heating cycle (2.3 "The appliance's heating cycle").

   If the heating cycle is not run, there is no heat demand; if this is the case, Tset will probably need to be set (11.4 "Setting the water temperature").

9.3 The appliance's heating cycle

The appliance's heating cycle is activated when the measured water temperature (T_3) falls below the threshold value (T_{set}). This set point value depends on the currently selected appliance operating mode. If the appliance is in the "OFF mode" (frost protection), for example, this value is 5°C. If the appliance is in the "ON mode", this set point can be selected, for example, 65°C.

The heating cycle runs successively through the following states:

1. HEAT DEMAND;
2. PRE-PURGE;
3. PRESSURE SWITCH;
4. PRE-GLOW;
5. IGNITION;
6. RUNNING 1;
7. RUNNING 2;
8. POST-PURGE.

The complete cycle is explained in the following example, which assumes the appliance is in the basic mode ON.

Note
The same heating cycle applies to the other operating modes.

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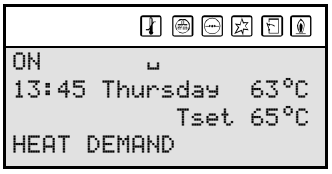
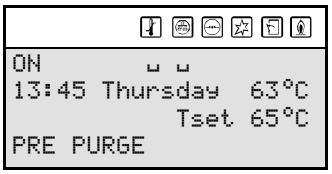
Once the appliance starts, it will run through the following steps:

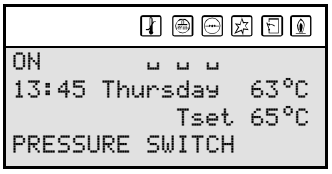
1. The water temperature drops below the set temperature of (for example) 65°C. The electronic controller detects a demand and starts the heating cycle.
   - The icon is activated.
   - The message HEAT DEMAND appears.



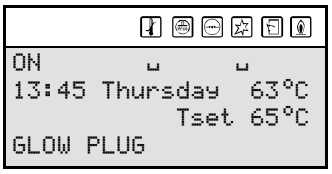
2. Following heat demand, the fan is powered up and the pre-purge begins. This lasts about 15 seconds. During this phase, any residual gases are removed.
   - The icon is activated.
   - The message PRE PURGE appears.



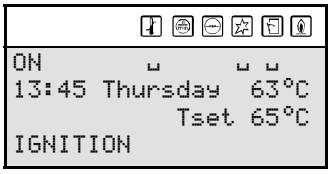
3. During the pre-purge, the pressure switch closes.
   - The icon is activated.
   - The message PRESSURE SWITCH appears.



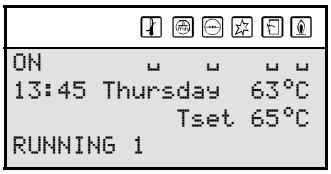
4. After a little time, the pre-purge ceases and the electronic controller reduces the speed of the fan to the rotational speed for ignition. This is followed by the (pre-)glow of the hot surface igniter.
   - The and icons are removed.
   - The icon is activated.



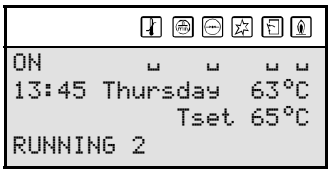
5. After a number of seconds pre-glow, the partial load gas control is opened and ignition takes place.
   - The icon is activated.
   - The IGNITION message appears.



6. After ignition, the flame is detected and the appliance will be running. This means that actual heating has started. The rotational speed of the fan then increases to the normal running speed for the partial load phase, and the pressure switch closes:
   - The icon is removed.
   - The and icons are activated.
   - The RUNNING 1 message appears.



7. If the temperature difference between T_{set} and T_3 is greater than the downward hysteresis plus the stage difference, then second gas control (full loaf gas control) is opened and the other burners ignite.
8. After ignition of the full load phase, the flame on these burners is not detected separately; the appliance is however operational. The rotational speed of the fan then increases to the normal running speed for the fully loaded phase:
   - The RUNNING 2 message appears.



9. When the water is almost up to temperature (T_{set} minus stage difference), the gas control for the full load phase closes and the fan's rate drops to the revs for the partially loaded phase.
   - The , , and icons remain activated.
   - The RUNNING 1 message appears.

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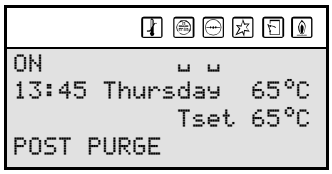
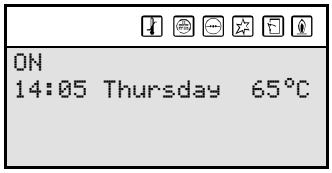
10. When the water is up to temperature, the heat demand drops off and the post-purge starts. This lasts about 25 seconds.
    - The , and icons are removed.
    - The icon is activated.
    - The message POST PURGE appears.



11. Following the post-purge, the fan stops and the pressure switch opens:
    - The and icons are removed.
    - The POST PURGE message is removed.



With any subsequent heat demand, the heating cycle will resume from step 1.

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10 Shutting down

10.1 Introduction

This chapter describes:

- Shutting the installation down for a brief period ("OFF mode");
- Isolating the appliance from the mains;
- Shutting the appliance and storage tank down for a long period.

10.2 Shutting the installation down for a brief period ("OFF mode")

To shut the installation down for a brief period, you must activate the frost protection.

You can use the frost protection to prevent water freezing in the appliance.

Activate the frost protection as follows:

1. Press the ⌓ button to select the main menu.
2. Use ↑ and ↓ to position the cursor in front of OFF.
   Confirm with ENTER.

```
OFF
13:45 Thursday  6°C
FROST PROTECTION
ACTIVATED
```

The frost protection cuts in if the water temperature drops below 5°C. The text FROST will then appear on line one of the display. The appliance heats the water to 20°C (T_{set}) and drops back to the OFF mode.

Note
These values of 5°C and 20°C cannot be adjusted.

10.3 Isolating the appliance from the mains

The appliance should only be isolated from mains power in the correct way. The correct procedure is as follows:

1. Activate the MENU with ⌓.
2. Position the cursor in front of OFF.
3. Confirm OFF with ENTER.

```
MENU
 →OFF
 ▲ ON
 ▼ WEEK PROGRAM
```

Caution
Failure to wait until the fan stops purging can cause damage to the appliance.

4. Wait until the fan has stopped. The icon then goes out.
5. Switch the appliance **OFF (position 0)** using the ON/OFF switch on the control panel.

IMD-0511 R1

6. Isolate the appliance from the power supply by setting the isolator between the appliance and the mains power supply to position 0.

10.4 Shutting the appliance and storage tank down for a long period

Drain the appliance and storage tank if you are shutting the installation down for a longer period of time. Proceed as follows:

1. Isolate the appliance from the power supply (10.3 "Isolating the appliance from the mains").
2. Shut off the gas supply.
3. Close the stop valve in the hot water pipe.
4. Close the supply valve of the protected cold supply setup.
5. Open the drain valve
6. Open the air valves to the appliance and storage tank so that the water can run out of them completely.

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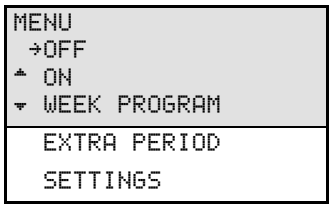
11 Main menu

11.1 Introduction

The MENU is reached by pressing the button of the electronic controller.



The main menu comprises:

- OFF
  Select this option if you wish to shut the appliance down (10 "Shutting down") for a brief period, but do not wish to drain it. In this mode, the frost protection is active. This prevents water from freezing in the appliance.
- ON
  In this mode, the appliance continually responds to the hot water demand (11.3 "Switching on the "ON mode"").
- WEEK PROGRAM
  Select this option to allow the appliance to respond to demand only during pre-programmed periods (11.5 "Week program"). Outside those periods, only frost protection is active.
- EXTRA PERIOD
  Use this option to overrule the OFF, ON or PROG positions (=weekly program) to meet the demand for hot water for a temporary period (11.10 "Extra period").
- SETTINGS
  Select this option to set (11.12 "Settings") the language and the time. You can also use this option to display the control range (temperature), and the ignition and running speeds of the fan.

Note
If you fail to make any selection with the main menu open, then after 30 seconds, the appliance will automatically return to the mode it was previously in.

11.2 Notational convention for menu-related instructions

The MENU ( ) of the electronic controller is divided into submenus. For example, SETTINGS is one of the functions reached from the main menu. The SETTINGS menu is divided into submenus in turn. For example, LANGUAGE is a submenu of SETTINGS. So, for example, to select the LANGUAGE menu, this manual uses the following notational convention:

- : SETTINGS | LANGUAGE
  Confirm with ENTER.

This means:

1. : Activate the main menu with .
2. SETTINGS: Use the ↑ and/or ↓ buttons to go to SETTINGS and confirm with ENTER.
3. LANGUAGE: Use the ↑ and/or ↓ buttons to go to LANGUAGE
4. Confirm with ENTER. After entering ENTER, you will have activated the LANGUAGE submenu.

11.3 Switching on the "ON mode"

You can switch the appliance to the ON mode from any operational mode, as follows:

1. : ON | START OPERATION
   Confirm with ENTER.

Note
First consult the chapter about switching on (9 "Starting and running") too.

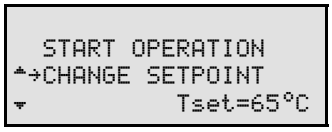
11.4 Setting the water temperature

11.4.1 Setting the water temperature via the SET POINT menu

The water temperature can be adjusted between 40°C and 85°C.

Set the water temperature via:

1. : ON | CHANGE SETPOINT
   Confirm with ENTER.



2. Use:

- ↑ to increase the value;
- ↓ to decrease the value.

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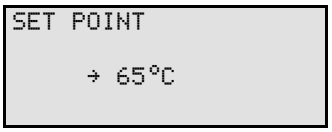
- Confirm with ENTER.After confirming, the appliance enters "ON mode".

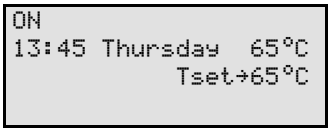


Note
If the temperature setting is higher than the current water temperature, it is possible that the appliance will **not** immediately start heating. To prevent excessively frequent switching on and off, there is a a heating margin. The standard margin setting is 4°C. The appliance starts heating up if the water temperature is 4°C below the SETPOINT.
We refer to this margin as the hysteresis. The service and maintenance engineer can set (12.2 "Setting the hysteresis") the hysteresis value.

11.4.2 Setting water temperature during ON mode

The water temperature can also be directly adjusted when the appliance is in the "ON mode". Simply use:

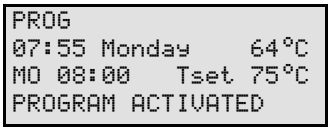
- ↑ to increase the value;
- ↓ to decrease the value.
- Confirm with ENTER.



11.5 Week program

Using the week program, you can set the water temperature for the days and times you want.

If the appliance is running under a week program, this is indicated on the display by the PROG text on the first line (see the figure). The second line shows the time of day, the day of the week and the temperature. The third line shows the next switching time of the week program and the programmed temperature. The fourth line shows the PROGRAM ACTIVATED text.



The appliance's default week program switches the appliance on every day at 00:00 and off at 23:59. The default water temperature setting is 65°C.

If you want, you can change every setting in the appliance's standard week program.

If the water temperature becomes too low while the week program is running, the appliance will run through the heating cycle (2.3 "The appliance's heating cycle") and return to the week program.

This following are discussed:

- Starting and stopping the week program
- Changing the appliance's standard week program
- Adding times to a week program
- Deleting times from a week program

11.6 Starting and stopping the week program

The week program can be started up from any other operating mode, as follows:

1. : WEEK PROGRAM | START OPERATION
   Confirm with ENTER.

A week program can be shut down simply by activating a different operating mode, for example the "ON mode".

11.7 Changing the appliance's standard week program

Note
First enter the desired week program on the program card supplied.

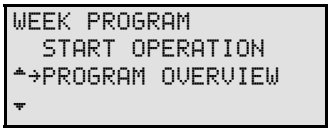
A week program is made up of a number of programmable periods in which you can have the appliance switch on and off. A period consists of:

- switch-on time: day of the week, hours and minutes:
- switch-off time: hours and minutes;
- the water temperature setting;
- on/off setting for a program-controlled pump.

Note
The switch-on and switch-off times may only be on the same day of the week. A maximum of **three** periods may be programmed per day. You can program a maximum of **21** periods.

Call the menu for the week program up as follows:

- : WEEK PROGRAM | PROGRAM OVERVIEW.
  Confirm with ENTER.



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The display shows the menu for the week program (see figure below). With the default setting, the program switches on and off every day at 00:00 and 23:59 respectively, the water temperature is 65ºC and the pump is switched on (P).

```
    DAY TIME Tset
ON →SU  00:00 65°C P
OFF SU  23:59
ON  MO  00:00 65°C P
OFF MO  23:59
ON  TU  00:00 65°C P
OFF TU  23:59
ON  WE  00:00 65°C P
OFF WE  23:59
ON  TH  00:00 65°C P
OFF TH  23:59
ON  FR  00:00 65°C P
OFF FR  23:59
ON  SA  00:00 65°C P
OFF SA  23:59
   INSERT
   DELETE
   START OPERATION
```

Example

As an example, we will set the switch-on time for Sunday to 08:15 and the corresponding switch-off time to 12:45. The water temperature will be set to 75ºC and the pump will run continuously.
The following settings are entered one by one using the menus: the switch-on time, the switch-off time, the desired water temperature and the mode of the program-controlled pump.

11.7.1 Week program: setting the switch-on time

1. Position the cursor at SU
   Confirm with ENTER.

```
ON  →SU 08:00
OFF  SU 08:00
Tset 65°C
PUMP ON       SAVE
```

   The day indicated by the → will blink.

2. Use ↑ and ↓ to set the desired day. In the example, this is SU (Sunday).

   Confirm with ENTER.

```
ON   SU→08:00
OFF  SU 08:00
Tset 65°C
PUMP ON       SAVE
```

   The cursor moves to the hour digits, which flash.

3. Use ↑ and ↓ to set the hour. In the example, this is 08.

   Confirm with ENTER.

   The cursor moves to the minute digits, which flash.

```
ON   SU 08→15
OFF  SU 08:15
Tset 65°C
PUMP ON       SAVE
```

Note
Because the switch-off time can never be earlier than the switch-on time, the switch-off time setting is automatically adjusted with the switch-on time.

4. Use ↑ and ↓ to set the minutes. In the example, this is 15.

   Confirm with ENTER.

   The cursor moves to the switch-off hour digits, which flash.

```
ON   SU 08:15
OFF  SU→08:15
Tset 65°C
PUMP ON       SAVE
```

11.7.2 Week program: setting switch-off time

1. Use ↑ and ↓ to set the hour. In the example, this is 12.

   Confirm with ENTER.

   The cursor moves to the minute digits, which flash.

```
ON   SU 08:15
OFF  SU 12→15
Tset 65°C
PUMP ON       SAVE
```

2. Use ↑ and ↓ to set the minutes. In the example, this is 45.

   Confirm with ENTER.

   The cursor moves to the desired water temperature.

```
ON   SU 08:15
OFF  SU 12:45
Tset→65°C
PUMP ON       SAVE
```

11.7.3 Week program: setting the water temperature

1. Use ↑ and ↓ to set the water temperature. In the example this is 75°C.

   Confirm with ENTER.

   The cursor moves to PUMP ON

```
ON   SU 08:15
OFF  SU 12:45
Tset 75°C
PUMP→ON       SAVE
```


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11.7.4 Week program: setting the program-controlled pump

1. If required, a pump can be controlled during the period. Use ↑ and ↓ to set PUMP ON The pump ensures a regular circulation of hot water in the hot water pipes. You can skip this step if you there is no pump in your hot water circuit.

   Confirm with ENTER.

   The cursor moves to SAVE.

```
ON   SU 08:15
OFF  SU 12:45
Tset 75°C
PUMP ON      →SAVE
```

2. Confirm with ENTER.

   The display shown in the figure will appear.

```
    DAY TIME Tset
ON →SU  08:15 75°C P
OFF SU  12:45
ON  MO  00:00 65°C P
OFF MO  23:59
ON  TU  00:00 65°C P
OFF TU  23:59
```

3. If you wish, you can use ↓ to scroll to another day, and change more switch-on (11.7.1 "Week program: setting the switch-on time") and switch-off times (11.7.2 "Week program: setting switch-off time").
4. After changing all desired switch-on and switch off times, you can start running the week program:

   Use ↓ to scroll to START OPERATION.
   Confirm with ENTER.

11.8 Adding times to a week program

The menu for INSERT switch-on and switch-off times to a week program is reached via:

1. : WEEK PROGRAM | PROGRAM OVERVIEW.

   Confirm with ENTER.

```
WEEK PROGRAM
  START OPERATION
↑→PROGRAM OVERVIEW
↓
```

   The display shows the menu for the week program. The cursor points to the active period.

```
    DAY TIME Tset
ON →SU  08:15 75°C P
OFF SU  12:45
ON  MO  00:00 65°C P
....................
....................
OFF SA  23:59
   INSERT
   DELETE
   START OPERATION
```

2. Scroll ↓ to INSERT.

   Confirm with ENTER.

The submenu for adding a period will appear.

```
ON  →SU  08:15
OFF  SU  12:45
Tset 65°C
PUMP ON       SAVE
```

Example

Asan example, we will program an extra period in which the switch-on time is set to 18:00, and the switch-off time to 22:00. The water temperature will be set to 75ºC and the pump will run continuously.

```
    DAY TIME Tset
ON →SU  18:00 75°C P
OFF SU  22:00
ON  MO  00:00 65°C P
OFF MO  23:59
....................
....................
OFF SA  23:59
   INSERT
   DELETE
   START OPERATION
```

3. Do the following:
   a. Set the switch-on time (11.7.1 "Week program: setting the switch-on time").
   b. Set the switch-off time (11.7.2 "Week program: setting switch-off time").
   c. Set the water temperature (11.7.3 "Week program: setting the water temperature").
   d. Set the program-controlled pump (11.7.4 "Week program: setting the program-controlled pump").
5. To activate the week program with the new period added, scroll ↓ to START OPERATION and confirm with ENTER.

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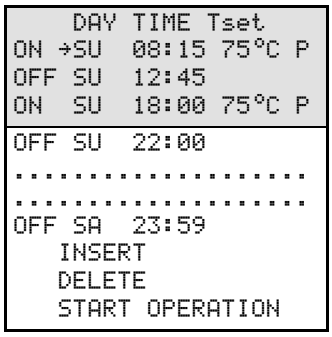
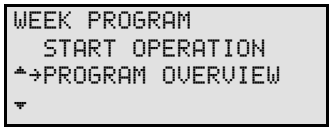
11.9 Deleting times from a week program

All switch-on/off times are shown sequentially in the display. Assume that the switch-on/off times for the appliance are programmed as in the figure.



To delete a period, proceed as follows:

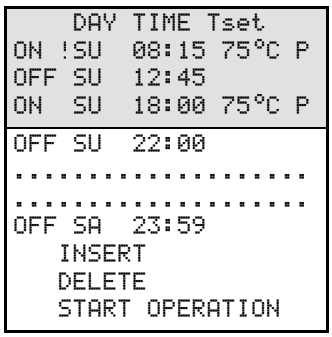


The display shows the menu for the week program.

1. Scroll ↓ to DELETE.

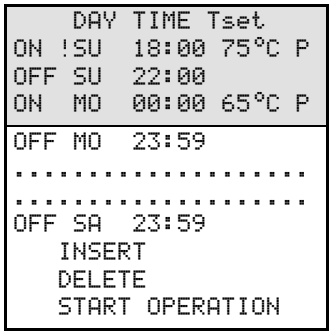
   Confirm with ENTER.

   To warn you that you are now working in the "delete" submenu, the cursor is replaced with an exclamation mark (!) and the period settings flash.



2. Scroll with ↓ to the day to be deleted. For example, the second period on SU (Sunday). See the figure.

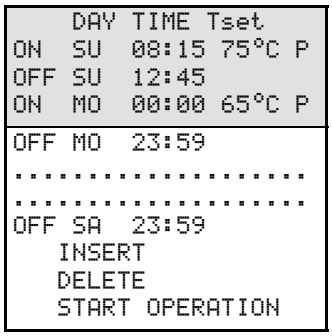
   Confirm with ENTER.



3. The lines showing switch-on/off times are replaced by DELETE BLOCK?. See the figure.

   Confirm with ENTER
   (or use RESET to cancel)

The switching period has been deleted. You will return now to the week program menu. The cursor points to the first programmed period.



4. Use ↓ to scroll to START OPERATION.

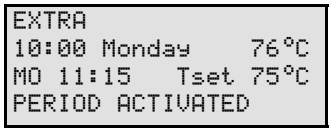
   Confirm with ENTER.

   The week program is active.

11.10 Extra period

Use an extra period when you either want to have the appliance switch on and off for a certain period, either without modifying the active week program, or without taking the appliance out of the ON or OFF mode (frost protection active).

If the appliance is running an "extra period", this is indicated in the display with EXTRA.



If the water temperature becomes too low during the extra period, the appliance will run through the heating cycle (2.3 "The appliance's heating cycle") and fall back into the extra period.

The same settings can be made for an extra period as for a week program (11.7 "Changing the appliance's standard week program") period.

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11.11 Programming an extra period

1. Call up the menu for entering an extra period via:
2. : EXTRA PERIOD

   Confirm with ENTER.

```
MENU
  ON
▲ WEEK PROGRAM
▼→EXTRA PERIOD
```

The display show the settings for the extra period.

11.11.1 Setting the switch-on time

1. Use ↑ and ↓ to set the day. In the example, this is SU.

   Confirm with ENTER.

   The cursor moves to the hour digits, which flash.

```
ON   SU→08:00
OFF  SU 08:00
Tset 65°C
PUMP ON      START
```

2. Use ↑ and ↓ to set the switch-on hour to the desired value. In the example, this is 08.

   Confirm with ENTER.

   The cursor moves to the minute digits, which flash.

```
ON   SU 08→15
OFF  SU 08:15
Tset 65°C
PUMP ON      START
```

Note
Because the switch-off time can never be earlier than the switch-on time, the switch-off time setting is automatically adjusted with the switch-on time.

3. Use ↑ and ↓ to set the minutes. In the example, this is 15.

   Confirm with ENTER.

   The cursor moves to the hour digits of the switch-off period.

```
ON   SU 08:15
OFF  SU→08:15
Tset 65°C
PUMP ON      START
```

11.11.2 Setting the switch-off time

1. Use ↑ and ↓ to set the hour. In the example, this is 12.

   Confirm with ENTER.

   The cursor moves to the minute digits, which flash.

```
ON   SU 08:15
OFF  SU 12→15
Tset 65°C
PUMP ON      START
```

2. Use ↑ and ↓ to set the minutes. In the example, this is 45.

   Confirm with ENTER.

   The cursor moves to the water temperature. See the figure.

```
ON   SU 08:15
OFF  SU 12:45
Tset→65°C
PUMP ON      START
```

11.11.3 Setting the water temperature

1. Use ↑ and ↓ to set the water temperature. In the example this is 75°C.

   Confirm with ENTER.

   The cursor moves to PUMP ON

```
ON   SU 08:15
OFF  SU 12:45
Tset 75°C
PUMP→ON      START
```

11.11.4 Setting the program-controlled pump

1. If required, a pump can be controlled during the period. Use ↑ and ↓ to set PUMP ON The pump ensures a regular circulation of hot water in the hot water pipes. You can skip this step if you there is no pump in your hot water circuit.

   Confirm with ENTER.

   The cursor moves to START.

```
ON   SU 08:15
OFF  SU 12:45
Tset 75°C
PUMP ON      →START
```

2. Confirm with ENTER.

The extra period has been programmed.

Note
When the extra period is finished, the controller returns to the ON, OFF or WEEK PROGRAM mode. The following week, the extra period will **NOT** be switched on automatically.

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11.12 Settings

Using the SETTINGS option, you can adjust certain settings and read certain appliance data:

- **Adjustable settings**
  - Language of the menu.
  - Current day of week and time.
- **Displayable appliance specifications**, this category is only relevant to the installation engineer and/or service and maintenance engineer
  - Control range (water temperature).
  - Ignition speed of fan.
  - Working speed of fan.

11.12.1 Setting menu language

To set menu language:

```
MENU
  WEEK PROGRAM
▲ EXTRA PERIOD
▼→SETTINGS
```

1. Call up the menu for selecting the language as follows:
2. : SETTINGS.

   Confirm with ENTER.

   The display shows the menu for settings.

```
SETTINGS
 →LANGUAGE
▲ DAY/TIME
▼ SPECIFICATIONS
```

3. The cursor is positioned in front of LANGUAGE

   Confirm with ENTER.

   The display shows the language selection menu.

```
LANGUAGE
  ENGLISH
▲ NEDERLANDS
▼→DEUTSCH
  FRANCAIS
  ITALIANO
  CZECH
```

4. Scroll to the desired language with ↓.

   Confirm with ENTER.

The language is set.

11.12.2 Setting day and time

To enter the time and day:

```
MENU
  WEEK PROGRAM
▲ EXTRA PERIOD
▼→SETTINGS
```

1. Call up the menu for entering the day and time as follows:
2. : SETTINGS.

   Confirm with ENTER.

   The display shows the menu for settings.
3. Scroll to DAY/TIME using ↑ and ↓

   Confirm with ENTER.

```
SETTINGS
  LANGUAGE
▲→DAY/TIME
▼ SPECIFICATIONS
```

   The display shows the submenu for adjusting the day.

```
DAY
        →Sunday
         Monday
         Tuesday
         Wednesday
         Thursday
         Friday
         Saturday
```

4. The cursor is positioned in front of Sunday.

   Scroll to the desired day using ↑ and ↓.

   Confirm with ENTER.

   The day has been set. The display shows the submenu for adjusting the time.

```
TIME
      →00:00
```

5. The cursor moves to the hour digits, which flash.

   Scroll w to the current hour, for example 15, using ↑ and ↓.

   Confirm with ENTER.

```
TIME
       15→00
```

6. The cursor moves to the minute digits, which flash.

   Scroll to the minute to come, for example 45, using ↑ and ↓.

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Confirm the minute setting with ENTER

```
TIME
       15→45
```

The time has been set.

Note
The appliance takes no account of summer time.

11.12.3 Displaying appliance specifications

Note
This category is only relevant to the installation engineer and/or service and maintenance engineer.

The table shows the correct settings.

		GWV 120
Ignition rotation speed (rpm)		1620
Working revs 1 (partial load) (rpm)		2040
Working revs 2 (full load) (rpm)		2340
Adjustability (°C)		40 - 85

	GWV 150	GWV 200
Ignition rotation speed (rpm)	1500	1800
Working revs 1 (partial load) (rpm)	2340	2460
Working revs 2 (full load) (rpm)	2700	2820
Adjustability (°C)	40 - 85	40 - 85

Bring up the menu to display the appliance specifications via:

1. : SETTINGS.

   Confirm with ENTER.

```
MENU
  WEEK PROGRAM
▲ EXTRA PERIOD
▼→SETTINGS
```

2. Scroll ↓ to SPECIFICATIONS

   Confirm with ENTER.

```
SETTINGS
  LANGUAGE
▲ DAY/TIME
▼→SPECIFICATIONS
```

   The display shows the submenu for displaying appliance specifications.

```
SPECIFICATIONS
 →REGULATION INTERVAL
▲ IGNITION SPEED
▼ WORKING SPEED
```

3. Scroll with ↓ to the section to be displayed, for example REGULATION INTERVAL.

   The relevant display appears.

```
REGULATION INTERVAL

     40-85°C
```


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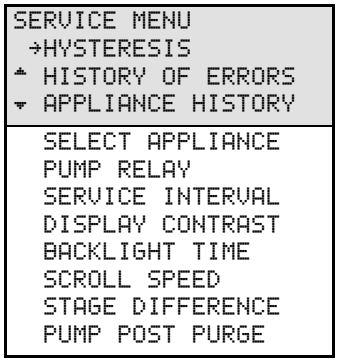
12 Service program

12.1 Introduction

The service program is used by the installation engineer or service and maintenance engineer for:

- Setting the hysteresis;
- Displaying the error history;
- Displaying the appliance history;
- Displaying the appliance selection;
- Switching the pump on or off;
- Setting the service interval;
- Setting the display contrast;
- Setting the display backlight switching period;
- Setting the display scroll speed;
- Setting the stage difference for the appliance;
- Setting the pump running-on time.



These submenus are briefly described in the following paragraphs. If you are not familiar in general with how to use the displays and menus, first read the relevant (7 "The control panel") chapter.

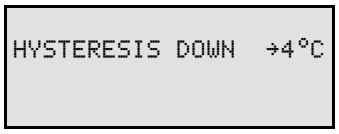
Note
The notation convention for the service menu is identical to that of the main menu (11.2 "Notational convention for menu-related instructions"). The difference is that you use ⊃ to call up the service program, instead of ⌓, which calls up the main menu.

12.2 Setting the hysteresis

If the preset temperature (SET POINT) is higher than the current water temperature, the appliance might not immediately start the heating cycle (2.3 "The appliance's heating cycle"). This is caused by the built-in safety margin. To prevent excessively frequent switching on and off, there is a heating margin. This margin is called the hysteresis. The hysteresis can be set DOWN (negative hysteresis). The hysteresis can be adjusted between 2°C and 7°C.

Set the hysteresis **DOWN** as follows:

- ⊃: HYSTERESIS DOWN
  The figure shows an example.



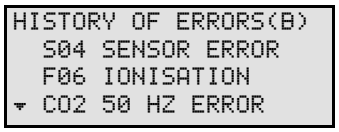
12.3 Displaying the error history

Display the error history as follows:

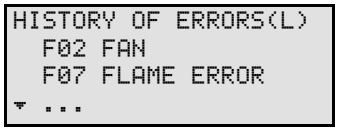
- ⊃: HISTORY OF ERRORS

The controller will display an overview of "Blocking errors" and "Lock out errors". In both cases, the electronic controller reserves 15 lines for the last 15 error messages. If there are fewer than 15 error messages, three points (...) are displayed. The display first shows the "Blocking errors". When ENTER is pressed, the "Lock out errors" are displayed.

The figure shows an example of "Blocking errors". The HISTORY OF ERRORS text is followed by (B).



The figure shows an example of "Lock out errors". The HISTORY OF ERRORS text is now followed by (L).



Note
For an overview of all errors and the possible causes, please refer to the relevant chapter (13 "Troubleshooting").

12.4 Displaying the appliance history

The appliance history submenu is used to display the burning hours, the number of ignitions, the number of flame errors and the number of ignition errors.

Call up the menu for displaying the appliance history as follows:

- ⊃: APPLIANCE HISTORY
  The figure shows an example.

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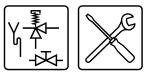

```
APPLIANCE HISTORY
 BURNINGHOURS 000410
▲IGNITIONS    001000
▼FLAME ERRORS 000021
 IGNIT ERROR  000013
```

12.5 Displaying the appliance selection

To display the appliance selection, use:

- ⚿: SELECT APPLIANCE

  The appliance number can be found on the rating plate.

  The appliance selection has been correctly preset in the factory.

```
SELECT APPLIANCE
 →5934
▲ 8576
▼ 3379
  6527
  2331
  3908
  2510
  7767
```

12.6 Switching the pump on or off

If a program-controlled pump is installed (3.10.4 "Connecting a program-controlled pump") then this can be turned ON or OFF via:

- ⚿: PUMP RELAY

  The standard setting for the pump is OFF.

```
PUMP RELAY
 →ON
  OFF
```

If the WEEK PROGRAM or EXTRA PERIOD modes are active, then the setting for the WEEK PROGRAM or EXTRA PERIOD modes takes priority over the ON/OFF selection for the pump relay in the service menu.

Example
One of the week program periods is active. During this period, the pump relay setting is OFF. If the pump relay is set ON in the service menu, the pump will nonetheless remain OFF. The pump will only switch ON once the week program period has ended.

12.7 Setting the service interval

To aid servicing, the electronic controller includes a service interval which is used to set the frequency of maintenance interval (14.2 "Determining service interval") by the service and maintenance engineer, based on the number of burning hours.

The service interval is based on the number of burning hours. This can be set to 500, 1000 and 1500 hours. The standard setting for number of hours is **500**. Once the preset number of hours is reached, a message (8.4 "Service condition"). to this effect will appear. Adjust the service interval via:

- ⚿: SERVICE INTERVAL

```
SERVICE INTERVAL
 → 500
▲ 1000 BURNING HOURS
▼ 1500
```

12.8 Setting the display contrast

Set the display contrast as follows:

- ⚿: DISPLAY CONTRAST

  The default setting is 100%. The range is 0 to 100%.

  The figure shows the related display.

```
DISPLAY CONTRAST

      → 90 %
```

12.9 Setting the display backlight switching period

Set the backlight time (the time that the display backlight remains lit after the last button is pressed) as follows:

- ⚿: BACKLIGHT TIME

  The default value is 255 seconds. The range is 0 to 255 seconds.

  The figure shows the related display.

```
BACKLIGHT TIME

      → 255 sec
```

12.10 Setting the display scroll speed

Adjust the control speed via:

- ⚿: SCROLL SPEED

  The default is 10. The range is from 0 through 100. Setting the value too high or low will make scrolling difficult.

```
SCROLL SPEED

       → 10
```

12.11 Setting the stage difference for the appliance

Switching from partial load to full load is handled by the electronic controller, using the stage difference. This value is adjustable.

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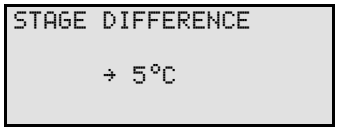
The appliance switches from partial load to full load if the temperature difference between the water in the storage tank (T_3) and the set point (T_{set}) minus the negative hysteresis is greater than this stage difference. Conversely, the apparatus switches from full load to partial load if this temperature difference is smaller than the stage difference.

The stage difference can be adjusted between 2°C and 8°C. The default stage difference is 5°C.

You can set the stage difference using:

- : STAGE DIFFERENCE

  The figure shows an example.

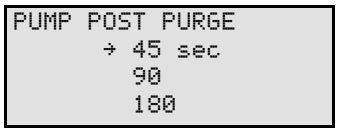


12.12 Setting the pump running-on time

Once the heat demand has been met, the heating cycle stops but the pump continues to run for a short time. The run-on time can be set to 45, 90 or 180 seconds. The default setting is 45 seconds. You can set the run-on time using:

- : PUMP POST PURGE

  The figure shows an example.



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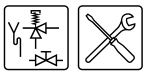

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13 Troubleshooting

13.1 Introduction

A distinction is made between:

- **General errors**

  General errors are not reported on the display. General errors are:

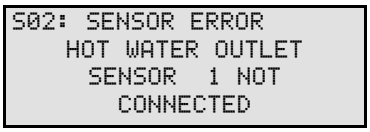
  - Gas smell
  - Display does not light up
  - Insufficient or no hot water.
  - Water leakage
  - Explosive ignition.

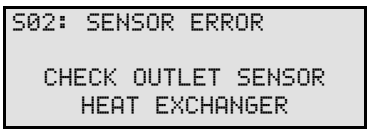
  The manual includes (13.2 "Troubleshooting table for general errors") a table with general errors.

- **Displayed errors**

  Errors are reported on the display as follows:

  - One: a code plus a brief description. The code consists of a letter and two digits.
  - Two, three and four: a long description, alternating with a recommended action every two seconds. See the figures. The first shows a possible error, the second shows the appropriate checking action.





  There are various types of errors, all falling into one of two groups:

  - LOCK OUT ERRORS
    When the cause has been removed, these errors must be reset with the RESET button before the appliance can resume operation.
  - BLOCKING ERRORS
    These errors disappear automatically when the cause of the error is removed, after which the appliance resumes operation by itself.

  The manual includes (13.3 "Troubleshooting table for displayed errors") a table of error messages that can appear on the display.

- **Displayed warnings**

  After resolving or removing the cause, the warnings (13.4 "Warnings") can be reset by pressing the RESET button and then ENTER.

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13.2 Troubleshooting table for general errors

Warning
Maintenance may only be performed by a qualified service and maintenance engineer.

General errors

Features	Cause	Measures to take	Comment
Gas smell	Gas leak	**Warning** Close the main gas valve immediately. **Warning** Do not operate any switches. **Warning** No naked flames. **Warning** Ventilate the boiler room.	**Warning** Contact your installation engineer or local gas company immediately.
Display is off	Appliance is turned off	Start the appliance up (9 "Starting and running")	
	No supply voltage present	1. Check if the isolator is ON. 2. Check that there is power to the isolator. 3. Check whether the ON/OFF switch of the electronic controller is ON (position I). 4. Check whether there is power to the electrical connector block. 5. The measured voltage must be 230 VAC (-15%, +10%).	See the GWV electrical diagram (17 "Appendices") If the error persists, consult your installation engineer.
	Defective fuse(s)	Replace fuse(s)	To replace the fuses, you must contact your installation engineer.
Water leakage	Leakage from a water connection (threaded)	Tighten the threaded connection	If the leak persists, consult your installation engineer
	Leakage from another nearby water appliance or pipe segment	Trace the leak	
	Leak from the storage tank	Consult the supplier and/or manufacturer	

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Features	Cause	Measures to take	Comment
Explosive ignition	Incorrect supply pressure and/or burner pressure	Set the correct supply pressure and/or burner pressure. (3.11 "Checking the supply pressure and burner pressure")	If ignition is not improved, consult your installation engineer.
	Contaminated burner	Clean the burner(s) (15.4.2 "Clean the burner(s)")	
	Contaminated orifice	Clean the orifice(s) (15.4.3 "Clean the injector(s)")	
Hot water supply insufficient or absent	Appliance is turned off	Start the appliance up (9 "Starting and running")	
	No supply voltage present	1. Check if the isolator is ON. 2. Check that there is power to the isolator. 3. Check whether the ON/OFF switch of the electronic controller is ON (position I). 4. Check whether there is power to the electrical connector block. 5. The measured voltage must be 230 VAC (-15%, +10%).	See the GWV electrical diagram (17 "Appendices") If the error persists, consult your installation engineer.
	Hot water supply is used up	Reduce hot water consumption and give the appliance time to heat up.	If there continues to be insufficient hot water, or none at all, consult your installation engineer.
	The controller is in OFF mode.	Switch the controller to the ON mode (11.3 "Switching on the "ON mode"")	
	Temperature (T_{set}) is set too low.	Adjust (11.4 "Setting the water temperature") temperature (T_{set}) to a higher value.	

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13.3 Troubleshooting table for displayed errors

Displayed errors

Code + description	Cause	Measures to take	Comment
S01 (blocking error) Open circuit for temperature sensor T_1, inlet to heat exchanger	Sensor is not (correctly) connected	Connect the sensor lead to JP3	See the GWV electrical diagram (17 "Appendices")
	Damaged cable or defective sensor	Replace sensor T_1	To replace the necessary parts, you must contact your installation engineer
S02 (blocking error) Open circuit for sensor 1 of temperature sensor T_2, outlet of heat exchanger	Sensor is not (correctly) connected	Connect the sensor lead to JP5	See the GWV electrical diagram (17 "Appendices")
	Damaged cable or defective sensor	Replace sensor T2(1)	To replace the necessary parts, you must contact your installation engineer
S03 (blocking error) Open circuit for sensor 2 of temperature sensor T_2, outlet of heat exchanger	Sensor is not (correctly) connected	Connect the sensor lead to JP5	See the GWV electrical diagram (17 "Appendices")
	Damaged cable or defective sensor	Replace sensor T2(1)	To replace the necessary parts, you must contact your installation engineer
S04 (blocking error) Open circuit in dummy 1	Dummy is not (correctly) connected	Connect the dummy sensor (dummy sensor 1 and 2) leads to JP4.	See the GWV electrical diagram (17 "Appendices")
	Defective dummy	Replace the dummy sensor(1)	To replace the necessary parts, you must contact your installation engineer
S05 (blocking error) Open circuit in dummy 2	Dummy is not (correctly) connected	Connect the dummy sensor (dummy sensor 1 and 2) leads to JP4.	See the GWV electrical diagram (17 "Appendices")
	Defective dummy	Replace the dummy sensor 2(1)	To replace the necessary parts, you must contact your installation engineer
S06 (blocking error) Open circuit for temperature sensor T_3 at the bottom of the storage tank.	Sensor is not (correctly) connected.	Connect the sensor lead to JP5	See the GWV electrical diagram (17 "Appendices")
	Damaged cable or defective sensor	Replace the sensor	To replace the necessary parts, you must contact your installation engineer

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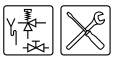

Code + description	Cause	Measures to take	Comment
S11 (blocking error) Short-circuit for temperature sensor T_1, inlet to heat exchanger	Short circuit in sensor circuit	Replace sensor T_1	To replace the necessary parts, you must contact your installation engineer
S12 (blocking error) Circuit for sensor 1 of temperature sensor T_2 is shorted.	Short circuit in sensor circuit	Replace sensor T_2[(1)]	To replace the necessary parts, you must contact your installation engineer
S13 (blocking error) Short-circuit for sensor 2 of temperature sensor T_2, outlet of heat exchanger	Short circuit in sensor circuit	Replace sensor T_2[(1)]	To replace the necessary parts, you must contact your installation engineer
S14 (blocking error) Short circuit from dummy 1	Short circuit in sensor circuit	Replace the dummy sensor[(2)]	To replace the necessary parts, you must contact your installation engineer
S15 (blocking error) Short circuit from dummy 2	Short circuit in sensor circuit	Replace the dummy sensor[(2)]	To replace the necessary parts, you must contact your installation engineer
S16 (blocking error) Circuit for temperature sensor T_3 at the bottom of the storage tank is shorted	Short circuit in sensor circuit	Replace sensor T_3	To replace the necessary parts, you must contact your installation engineer

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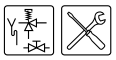

Code + description	Cause	Measures to take	Comment
F01 (blocking error) Defect in power supply circuit	Live and neutral connected wrong way round	Connect live and neutral correctly (3.10 "Electrical connection"); the appliance is phase-sensitive	See the GWV electrical diagram (17 "Appendices")
	Condensation on the flame probe	1. Disconnect the lead at the flame probe 2. Ignite the appliance three times, with an interrupted ionisation circuit 3. Reconnect the ionisation lead to the flame probe 4. Ignite the appliance again 5. The repeated ignition attempts will have caused the condensation to evaporate	If the error persists, contact your installation engineer
F02 (lock out error) Fan fails to run at correct speed.	Damaged wiring	1. Check the wiring between the fan and the controller. 2. If any wires are damaged, the wiring harness must be replaced. 3. Reset appliance controller	See the GWV electrical diagram (17 "Appendices") To have the wiring replaced and a new fan fitted, you must contact your installation engineer
	Dirty or blocked fan	1. Check if the fan is dirty 2. Check that the rotor can rotate freely 3. Reset appliance controller	
	Because of a drop in the supply voltage, the fan is not running at the correct speed.	1. Check the supply voltage, this must be 230 VAC (-15%, +10%). 2. Reset appliance controller	

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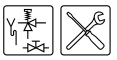

Code + description	Cause	Measures to take	Comment
F03 (lock out error) The pressure switch fails to work correctly	Damaged wiring/Open circuit	1. Check the wiring between the pressure switch and the controller 2. If necessary, replace the wiring	If the error cannot be resolved or is persistent, contact your installation engineer To replace the necessary parts, you must contact your installation engineer
	Pressure switch not closing	1. Check the running speed of the fan (12.5 "Displaying the appliance selection") 2. Check that the hoses are fitted correctly to the pressure switch and the ventilator's air supply hose. Refit them if necessary 3. Check for cracks in the hoses on the pressure switch and in the air supply hose for the fan. If necessary, replace the hoses. 4. Check that the flue gas outlet is compliant (3.9 "Air supply and flue"). 5. Measure the pressure differential across the pressure switch. See the table (2.4.5 "Pressure switch"). If there is insufficient pressure difference, clean the heat exchanger. If the pressure differential is acceptable, check that the pressure switch is closing, using a multimeter.	

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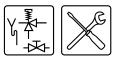

Code + description	Cause	Measures to take	Comment
F04 (lock out error) Three unsuccessful ignition attempts.	No gas	1. Open the main gas valve and/or the manual gas valve supplying the water heater 2. Check the supply pressure to the gas control 3. If necessary, repair the gas supply	To repair the gas supply, contact your installation engineer
	Air in the gas pipes	Bleed the air out of the gas pipe	See Checking the supply pressure and burner pressure for how to bleed air from the gas line, and measure the supply pressure and burner pressure. To replace the necessary parts, you must contact your installation engineer
	No burner pressure	1. Check the burner pressure to the gas control 2. Check that the gas valve(s) open and shut correctly 3. If necessary, replace the gas control.	
	Defect in the hot surface igniter circuit	1. Check that the hot surface igniter is correctly connected (JP2). 2. Check the wiring of the hot surface igniter. 3. Measure the resistance across the hot surface igniter. This must lie between 2 and 5 ohms. 4. Check that the hot surface igniter lights up during ignition. 5. If necessary, replace the hot surface igniter.	If the error persists, contact your installation engineer. To replace the necessary parts, you must contact your installation engineer
	Defect in the ionisation circuit	1. Check that the flame probe is correctly connected (JP2) 2. Check the wiring of the flame probe 3. Measure the ionisation current. This must be at least 1.5 microamps. 4. Replace the wiring if necessary.	
	Supply voltage too low	Check the supply voltage, this must be 230 VAC (-15%, +10%).	
F05 (lock out error) Too many flame errors have been signalled.	Incorrect roof or wall conduit. Recirculating flue gases.	1. Check that the correct roof or wall flue conduit (3.9 "Air supply and flue") has been fitted. 2. If necessary, install the correct roof or wall conduit. 3. Check that the roof or wall conduit discharges into a permitted area.	If the error cannot be resolved or is persistent, contact your installation engineer

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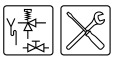

Code + description	Cause	Measures to take	Comment
F06 (blocking error) Short circuit between flame probe and earth	Damaged cable in contact with metal surface.	Check the wiring of the flame probe. Replace the wiring if necessary..	If the error persists, contact your installation engineer. To replace the necessary parts, you must contact your installation engineer.
	Ceramic part of the flame probe is broken/cracked.	1. Check that the ceramic part of the flame probe is still intact in the vicinity of the burner's air distribution plate. 2. If not, the flame probe must be replaced.	
F07 (lock out error) A flame has been detected after the gas valve was closed.	Defective gas valves	1. Check whether there is still burner pressure present after the gas valves have closed. 2. Check whether a flame is still present after the gas valves have closed. 3. If this is the case, the gas control must be replaced.	If the error cannot be resolved or is persistent, contact your installation engineer To replace the necessary parts, you must contact your installation engineer
F08 (lock out error) Error message from safety relay	Flame detection before the gas valve opened.	1. Reset electronic controller. 2. If the error appears again, replace the electronic controller. 3. If this is the case, the gas control must be replaced.	If the error cannot be resolved or is persistent, contact your installation engineer To replace the necessary parts, you must contact your installation engineer
F09 (lock out error) Water temperature safety.	Temperature T_1, T_2 or T_3 is greater than 99°C.	1. Check that the system pump is functioning. 2. Check the position of the temperature sensor T_1., T_2 and T_3. 3. Reset appliance controller	Error F09 remains active in the event that the water temperature during a reset was higher than 90°C. If this is the case, first draw water off by opening the nearest hot water tap, so that cold water can flow in. If the error cannot be resolved or is persistent, contact your installation engineer

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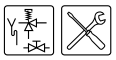

Code + description	Cause	Measures to take	Comment
F10 (lock out error) Restriction on the number of ignition attempts based on pressure switch state changes.	Pressure switch not closing	1. Check the running speed of the fan 2. Check that the hoses are fitted correctly to the pressure switch and the ventilator's air supply hose. Refit them if necessary 3. Check for cracks in the hoses on the pressure switch and in the air supply hose for the fan. If necessary, replace the hoses. 4. Check that the flue gas outlet is satisfactory. 5. Measure the pressure differential across the pressure switch. See the table (2.4.5 "Pressure switch"). If there is insufficient pressure difference, clean the heat exchanger. If the pressure differential is acceptable, check that the pressure switch is closing, using a multimeter.	If the error cannot be resolved or is persistent, contact your installation engineer To replace the necessary parts, you must contact your installation engineer
F11 (blocking error) Flame detection with closed gas valve.	Defective gas valves	See F07.	
F16 (lock out error) Flow switch does not close	Component is not (correctly) connected	Remove the protective cap from the flow switch and connect the wires to terminals COMM and N.O.	If the error cannot be resolved or is persistent, contact your installation engineer
	Component is not (correctly) connected to the controller	Connect the component's controller to connector JP!2.	See the GWV electrical diagram (17 "Appendices")
	Blocked vane switch	Disassemble the flow switch from the T-piece and remove any lime accretions or baked-on dirt from the van switch.	For repairing and cleaning the component, contact your installation engineer.

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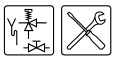

Code + description	Cause	Measures to take	Comment
C02 (lock out error) Error message from the appliance controller.	Incorrect reference voltage from the AD converter.	1. Reset electronic controller. 2. Check that the frequency of the power supply is compliant (3.4.2 "General and electrical specifications"). If this is not the case, contact your installation engineer 3. If the frequency is correct but the error persists, replace the electronic controller.	To replace the necessary parts, you must contact your installation engineer
Internal error message from the appliance controller.	• EEPROM read error • 50 Hz error • Internal communication error		
Internal error message from the appliance controller.	• Gas valve relay error • Safety relay error • Ignition relay error • RAM error • EEPROM error • EEPROM contents do not match the software version • Processor software error		
C04 (blocking error) Appliance selection error	Incorrect appliance selection / Incorrect selection resistor	1. Check whether the correct appliance is selected (12.5 "Displaying the appliance selection"). 2. If the correct appliance is selected, fit the correct selection resistor. 3. If incorrect appliance selected, select the correct one.	If the error cannot be resolved or is persistent, contact your installation engineer To replace the necessary parts, you must contact your installation engineer

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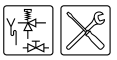

Code + description	Cause	Measures to take	Comment
E03 (lock-out error) Error in temperature sensor T_2, outlet of heat exchanger(1)	The two temperature sensors in the tank detect a differential of ≥ 10 °C over a period of at least 60 seconds.	1. Check sensor position and wiring. 2. If necessary, reset the electronic controller. Replace the sensor if the error persists.	To replace the necessary parts, you must contact your installation engineer
E04 (lock-out error) Error in dummy sensor(2).	The two dummy sensors in the tank detect a differential of ≥ 10 °C over a period of at least 60 seconds.	1. Check leads from dummy 1 and dummy 2. 2. If necessary, reset the electronic controller. Replace the dummy sensor if the error persists.	To replace the necessary parts, you must contact your installation engineer
E05 (lock out error) Controller too long in a blocking error	The controller has been in a blocking error for at least 20 hours.	1. Resolve the blocking error and press RESET to remove the lock out error.	To resolve the blocking error, see fault description for the error concerned.
E07 (lock out error) Temperature difference across the heat exchanger too large	Defective pump	1. Check that the pump is working correctly	To replace the necessary parts, you must contact your installation engineer
	Blocked or bunged up pipe system	1. Replace blocked or distorted parts of the pipe system. 2. Clean the pipes to remove any lime accretions or baked-on dirt.	For repairing and cleaning the pipe system, contact your installation engineer.
	Wrong pump mode	1. Check the pump operating mode according to the table	If the error cannot be resolved or is persistent, contact your installation engineer

Note:

(1) Temperature sensor T_2 is a '2 in 1' sensor; T_2 contains 2 NTCs for maximum thermostat and safety thermostat protection.

(2) The dummy flue gas sensor consists of dummy flue gas sensor 1 and dummy flue gas sensor 2.

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13.4 Warnings

Warning
Maintenance may only be performed by a qualified service and maintenance engineer.

Features	Cause	Measures to take	Comment
The display shows the text: !!! WARNING !!! WORKING SPEED 2 FAN NOT CORRECT (see note 1)	Fan is running at the wrong speed during full load.	1. Check running speed 2 of the fan (12.5 "Displaying the appliance selection") 2. Check whether the flue gas discharge is compliant with the table. 3. Check that the flue gas outlet is not blocked; remove any blockage.	If the error cannot be resolved or is persistent, contact your installation engineer. To replace the necessary parts, you must contact your installation engineer.
The display shows the text: !!! WARNING !!! TEMPERATURE DIFFERENCE HEAT EXCHANGER TOO LARGE (see note 1)	Defective pump	Check that the pump is working correctly	To replace the necessary parts, you must contact your installation engineer.
	Blocked or bunged up pipe system	1. Replace blocked or distorted parts of the pipe system. 2. Clean the pipes to remove any lime accretions or baked-on dirt.	For repairing and cleaning the pipe system, contact your installation engineer.
	Wrong pump mode	Check the pump mode (3.6.4 "System pump")	If the error cannot be resolved or is persistent, contact your installation engineer.
The display shows the text: !!! WARNING !!! SHORT HEATING CYCLES SAFETY (see note 2)	The appliance is oscillating between full load and partial load.	1. Change the margin between switching in full load and partial load by changing the stage difference via "service program | stage difference"	If the error cannot be resolved or is persistent, contact your installation engineer.

Note:

(1) As a result of this warning, the appliance will switch to partial load and remain active in that mode until the warning is cleared with RESET and ENTER

(2) As a result of this warning, the controller will insert a delay of 180 seconds between switching off the stage in question and then starting it up again.

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14 Maintenance frequency

14.1 Introduction

A service should be carried out at least once a year, both on the water side and on the gas side. Maintenance frequency depends, among other things, on the water quality, the average burning time per day and the set water temperature.

Note
Regular maintenance extends the service life of the appliance.

To determine the correct maintenance frequency, it is recommended to arrange for the service and maintenance engineer to check the appliance on both the water and gas side, three months after installation. Based on this check, the best maintenance frequency can be determined.

14.2 Determining service interval

To aid servicing, the electronic controller has a service interval with which the service and maintenance engineer can determine the frequency of maintenance, based on the number of burning hours.

The service interval can be set to: 500, 1000 or 1500 burning hours. The standard setting is 500 burning hours.

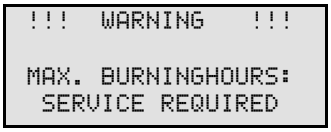
Example
In the first three months, the appliance has burned for 300 hours. During maintenance, it is evident that one service per year will be sufficient. Therefore, after one year, some 1200 burning hours will have elapsed. The first value below 1200 hours that can be selected is 1000 burning hours.

In this case, the service and maintenance engineer sets the interval to 1000.

In the first three months, the appliance has burned for 300 hours. During maintenance, it is evident (perhaps due to the water quality) that service will be required at least once every 6 months.

Therefore, after six months, some 600 burning hours will have elapsed. The first value below 600 hours that can be selected is 500 burning hours.

In this case, the service and maintenance engineer sets the interval to 500.



When the set number of burning hours has elapsed, the SERVICE REQUIRED message will appear on the display. Soon after the message appears, contact should be made with the service and maintenance engineer.

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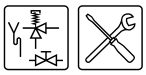

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15 Performing maintenance

15.1 Introduction

Caution
Maintenance may only be performed by a qualified service and maintenance engineer.

At each service, the appliance undergoes maintenance on both the water side and the gas side. The maintenance must be carried out in the following order.

1. Preparation for maintenance
2. Water-side maintenance
3. Gas-side maintenance
4. Finalizing maintenance

Note
To order spare parts, it is important to write down the appliance type and model, and the full serial number of the appliance. These details can be found on the rating plate. Only by ordering with this information can you be sure to receive the correct spare parts.

15.2 Preparation for maintenance

To test whether all components are still working properly, complete the following steps:

1. Activate the MENU with .
2. Use ↑ and ↓ to position the cursor in front of OFF.
3. Confirm OFF with ENTER.

4. Wait until the fan has stopped. The icon then goes out.

Caution
Failure to wait until the fan stops purging can cause damage to the appliance.

5. Switch the appliance **OFF (position 0)** using the ON/OFF switch on the control panel.

IMD-0511 R1

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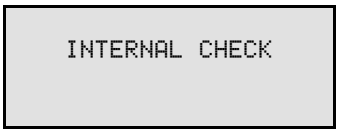
6. Switch the electronic controller **ON** by setting the On/Off switch to **position I**.



The display will now show INTERNAL CHECK for about 10 seconds and go to the main menu.

7. Activate the 'ON mode' by going through the following steps:
   - Press the blue arrow once (↓) to position the cursor in front of ON and press ENTER.
   - Confirm the START OPERATION by pressing ENTER.
8. If there is no heat demand, increase Tset (11.4 "Setting the water temperature"). Note the original setting. If there is no demand, draw some hot water off to create demand.
9. Check whether the heating cycle runs correctly (2.3 "The appliance's heating cycle").
10. If you have adjusted T_{set} , return it to the original value (11.4 "Setting the water temperature").
11. Carefully remove the sheeting from the front of the appliance.
12. Check the supply and burner pressures (3.11 "Checking the supply pressure and burner pressure") and adjust these where necessary.
13. Check that all components of the flue gas system are properly attached.
14. Check the pressure differential across the orifice plate of the pressure switch (see the table). If the pressure difference is too low, the flue gas outlet and air supply should be checked for blockages.

Pressure switch differential

Appliance	**Observed pressure differential across the pressure switch (Pa)**
GWV 120	≥ 66
GWV 150	≥ 75
GWV 200	≥ 92

15. Test the operation of the overflow valve of the protected cold supply set-up. The water should spurt out.
16. Test the overflow operation of the P-valve. The water should spurt out.
17. Check the drainage pipes from the discharge points of all valves and remove any scale deposits that may be present.
18. Drain (6 "Draining") the appliance.

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15.3 Water-side maintenance

15.3.1 Introduction

The following steps must be carried out on the water side:

1. Checking the anodes
2. Descaling and cleaning the storage tank

15.3.2 Checking the anodes

Timely replacement of the anodes extends the service life of the appliance. The appliance's anodes must be replaced as soon as they are 60% used or more (take this into consideration when determining the maintenance frequency).

1. Loosen the anodes using suitable tools.
2. Check the anodes, and if necessary, replace them.

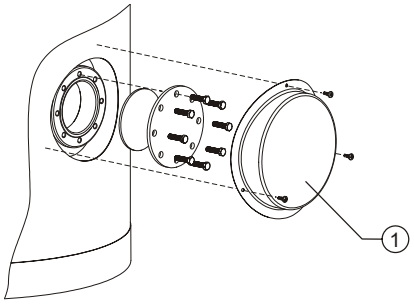
15.3.3 Descaling and cleaning the storage tank

Scale and lime buildup prevent effective conduction of the heat to the water. Periodic cleaning and descaling prevents buildup of these deposits. This increases the service life of the appliance, and also improves the heating process.

Take the rate of scale formation into account when deciding on maintenance frequency. Scale formation depends on the local water composition, the water consumption and the water temperature setting. A water temperature setting of maximum 60°C is recommended for prevention of excessive scale buildup.

To guarantee a good, watertight seal around the cleaning opening, replace the gasket, washers, bolts and, if necessary, the lid with new parts before reassembly (see the figure). A special set is obtainable from the supplier/manufacturer.

To simplify descaling and cleaning of the tank, the storage tank has a cleaning opening.



IMD-0512 R0

1. Remove the cover plate (1) on the outer jacket (see the figure).
2. Undo the bolts.
3. Remove the cover and the gasket.
4. Inspect the storage tank and remove the loose limescale deposits and contamination.
5. If the scale cannot be removed by hand, then the appliance will need to be descaled using a descaling agent. Contact the supplier for advice on the preferred descaling agent.
6. Close the cleaning opening. To avoid damage to the storage tank, tighten the bolts that fasten the lid with a torque no greater than 50 Nm. Use suitable tools for this.

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15.4 Gas-side maintenance

15.4.1 Introduction

The following steps must be carried out on the gas side:

1. Clean the burner(s)
2. Clean the injector(s)
3. Cleaning the aluminium strips

15.4.2 Clean the burner(s)

1. Dismantle first the yellow flexible gas hose, the manifold and then the burner(s).
2. Remove all contamination present on the burner(s).
3. Fit the burner(s)

15.4.3 Clean the injector(s)

1. Dismantle the injector(s)
2. Remove all contamination present in the injector(s).
3. Fit the injector(s), then the manifold and then the flexible gas hose.

15.4.4 Cleaning the aluminium strips

1. Dismantle the flue gas outlet
2. Use a vacuum cleaner to clean the aluminium strips.

15.5 Finalizing maintenance

To finalize the maintenance carry out the following steps:

1. Fill the appliance (5 "Filling").
2. Start the appliance (9 "Starting and running").
3. Erase the message SERVICE REQUIRED. Do this by pressing once on RESET then once on ENTER.

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16 Warranty (certificate)

To register your warranty, you should complete and return the enclosed warranty card after which a warranty certificate will be sent to you. This certificate gives the owner of a appliance supplied by A.O. Smith Water Products Company B.V. of Veldhoven, The Netherlands (hereinafter "A.O. Smith") the right to the warranty set out below, defining the commitments of A.O. Smith to the owner.

16.1 General warranty

If within one year of the original installation date of an appliance supplied by A.O. Smith following verification, and at the sole option of A.O. Smith, a section or part proves to be defective or fails to function correctly due to manufacturing and/or material defects, then A.O. Smith shall repair or replace this section or part.

16.2 Appliance warranty

If within 5 years of the original installation date of an appliance supplied by A.O. Smith following verification and at the sole option of A.O. Smith, it transpires that the heat exchanger leaks from the water side, A.O. Smith will provide a complete new appliance of the same size and quality. The warranty period given on the replacement appliance shall be equal to the remaining warranty period of the original appliance that was supplied. Notwithstanding the stipulations earlier in this article, in the event that unfiltered or softened water is used, or allowed to stand in the appliance, the warranty shall be reduced to one year from the original installation date.

16.3 Conditions for Installation and use

The warranty set out in article 1 and 2 will apply solely under the following conditions:

a. The appliance is installed under strict adherence to the installation instructions of A.O. Smith for the specific model, and the relevant local authority installation and building codes, rules and regulations in force.

b. The appliance remains installed at the original site of installation.

c. The appliance is exclusively used with drinking water, which at all times can freely circulate (a separately installed heat exchanger is mandatory for heating salt water or corrosive water).

d. The storage tank is safeguarded against harmful scaling and lime accretion by means of periodic maintenance.

e. The water temperatures in the appliance do not exceed the maximum setting of the thermostats, which form a part of the appliance.

f. The water pressure and/or heat load do not exceed the maximum values stated on the appliance's rating plate.

g. The appliance is installed in a non-corrosive atmosphere or environment.

h. The appliance is connected to a protected cold supply arrangement, which is: approved by the relevant authority; has sufficient capacity for this purpose; supplying a pressure no greater than the working pressure stated on the appliance; and where applicable by a likewise approved temperature and pressure relief valve, fitted in accordance with the installation instructions of A.O. Smith applying to the specific model of the appliance, and further in compliance with the government and local authority installation and building codes, rules and regulations.

i. The storage tank is at all times fitted with cathodic protection. If sacrificial anodes are used for this, these must be replaced and renewed when, and as soon as, they are 60% consumed or more. When electric anodes are used, it is important to ensure that they continue to work properly.

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16.4 Exclusions

The warranty set out in articles 1 and 2 will not apply in the event of:

a. damage to the appliance caused by an external factor;

b. misuse, neglect (including frost damage), modification, incorrect and/or unauthorised use of the appliance and any attempt to repair leaks;

c. contaminants or other substances having been allowed to enter the storage tank;

d. the conductivity of the water being less than 125µS/cm and/or the hardness (alkaline-earth ions) of the water being less than 1.00 mmol/l (3.3.3 "Water composition");

e. unfiltered, recirculated water flowing through or being stored in the appliance;

f. any attempts at repair to a defective appliance other than by an approved service engineer.

16.5 Scope of the warranty

The obligations of A.O. Smith by virtue of the warranty provided do not extend beyond delivery free of charge from the warehouse of the parts or components or appliance to be replaced; transport, labour, installation and other costs associated with the replacement will not be borne by A.O. Smith.

16.6 Claims

A claim on grounds of the specified warranty must be submitted to the dealer from whom the appliance was purchased, or to another authorised dealer for the products of A.O. Smith Water Products Company. Inspection of the appliance as referred to in articles 1 and 2 shall take place in one of the laboratories of A.O. Smith.

16.7 Obligations of A.O. Smith

A.O. Smith grants no other warranty or guarantee over its appliances nor the (parts or components of) appliances supplied for replacement, other than the warranty expressly set out in this Certificate.

A.O. Smith is not liable for damage to persons or property caused by (parts or components, or the glass-lined steel storage tank of) a (replacement) appliance that it has supplied under the terms of this warranty, nor on any other grounds.

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17 Appendices

17.1 Introduction

This appendix contains:

- Electrical diagram (17.2 "Electrical diagram")
- Week program card

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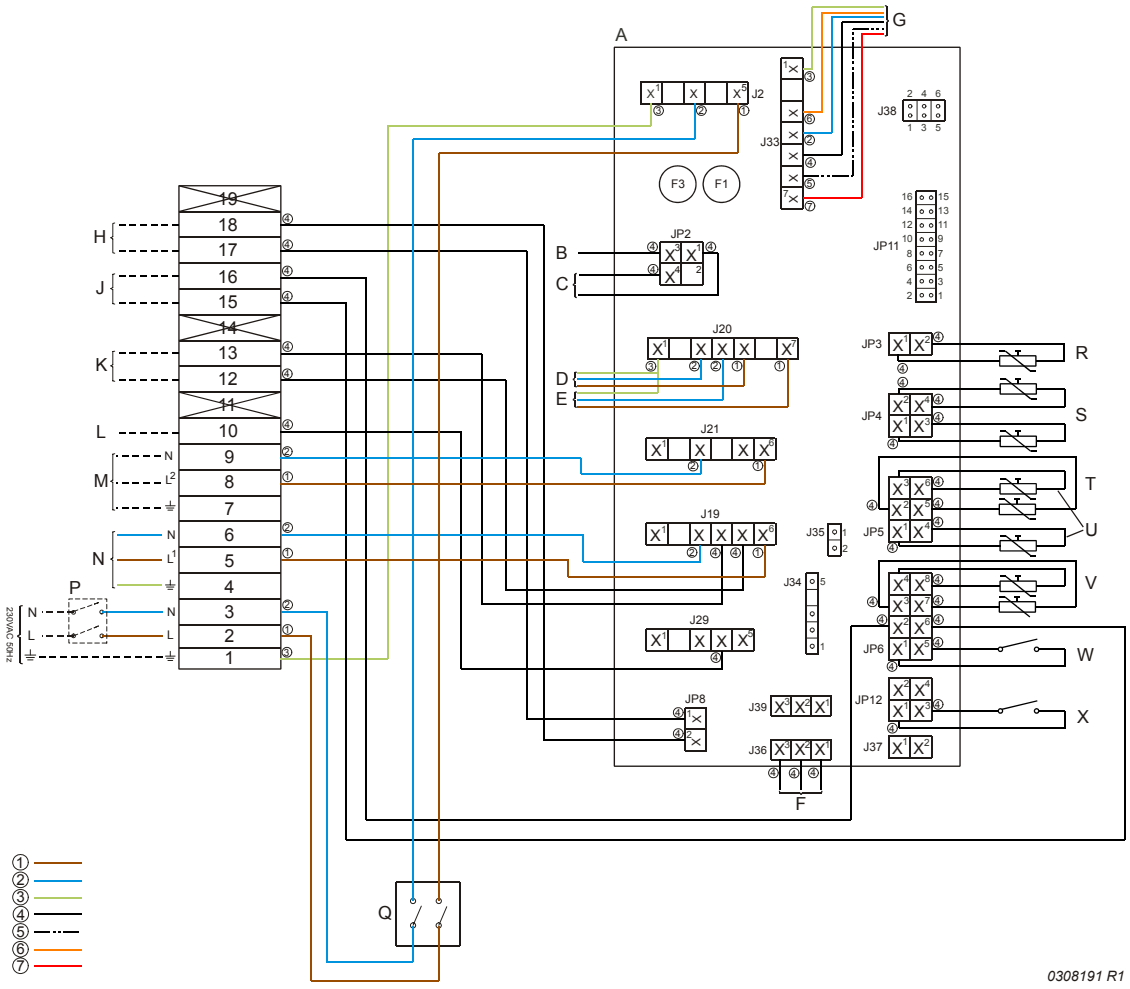
17.2 Electrical diagram

Electrical diagram



1 = brown, 2 = blue, 3 = yellow/green, 4 = black, 5 = white, 6 = orange, 7 = red

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TERMINAL BLOCK CONNECTIONS:

⏚	Earth
N	Neutral
L	Phase input of controller
L^1	Phase input of system pump
L^2	Phase input of program-controlled pump

COMPONENTS:

A	Controller
B	Flame probe
C	Hot surface igniter
D	Gas control 1
E	Gas control 2
F	Display
G	Fan
H	External ON mode switch
J	n/a
K	Alarm signal
L	n/a
M	Program-controlled pump
N	System pump
P	Double-pole isolator
Q	0/1 switch of controller
R	Temperature sensor (T1 - heat exchanger inlet)
S	Dummy
T	Temperature sensor (T3 -Tank)
U	Temperature sensor (T2 - heat exchanger outlet)
V	Selection resistor
W	Air pressure switch
X	Flow-through switch

CONTROLLER CONNECTIONS:

J2	Connection for controller power
J19	Connection for system pump and alarm signal
J20	Connection for gas controls
J21	Program-controlled pump connection
J29	n/a
J33	Fan connection
J36	Connection of display to controller
JP2	Flame probe and hot surface igniter connection
JP3	Temperature sensor T1 connection
JP4	Dummy connection
JP5	Connection for temperature sensors T2 and T3
JP6	Selection resistor and air pressure switch connection
JP8	Extra ON mode switch connection
JP12	Connection for flow-through switch
F1	Fuse
F3	Fuse

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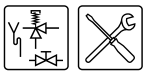

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17.3 Week program card

You can cut the week program card out and keep it near the appliance.

Period		DAY	TIME	Tset	Pump
1.	ON			....°C	ON / OFF
	OFF				
2.	ON			....°C	ON / OFF
	OFF				
3.	ON			....°C	ON / OFF
	OFF				
4.	ON			....°C	ON / OFF
	OFF				
5.	ON			....°C	ON / OFF
	OFF				
6.	ON			....°C	ON / OFF
	OFF				
7.	ON			....°C	ON / OFF
	OFF				
8.	ON			....°C	ON / OFF
	OFF				
9.	ON			....°C	ON / OFF
	OFF				
10.	ON			....°C	ON / OFF
	OFF				
11.	ON			....°C	ON / OFF
	OFF				

Period		DAY	TIME	Tset	Pump
12.	ON			....°C	ON / OFF
	OFF				
13.	ON			....°C	ON / OFF
	OFF				
14.	ON			....°C	ON / OFF
	OFF				
15.	ON			....°C	ON / OFF
	OFF				
16.	ON			....°C	ON / OFF
	OFF				
17.	ON			....°C	ON / OFF
	OFF				
18.	ON			....°C	ON / OFF
	OFF				
19.	ON			....°C	ON / OFF
	OFF				
20.	ON			....°C	ON / OFF
	OFF				
21.	ON			....°C	ON / OFF
	OFF				

Example

Period		DAY	TIME	Tset	Pump
1.	ON	MO	14:30	70°C	ON / OFF
	OFF	MO	16:15		

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Index

A

ambient temperature 20
appliance
  displaying history 69
  displaying selection 70

C

connect
  air supply 29
  cold water side 26, 28
  electrical 33
  hot water side 28
connecting cold water side 26, 28
connecting flue gas discharge 29
connecting hot water side 28
controls 61
conversion to a different gas category 41

D

display 51
displaying error history 69
document contents 11
draining 47

E

electrical connection 33
error 54

F

filling 43
flame probe 18
forms of notation 10

G

gas category, conversion to different 41
general specifications 3

H

heating cycle 15
humidity 20

I

icons
  (pre)glow 51
  explanation 51
  flame detection 51
  gas control 51
  heat demand 51
installation diagram 25, 43, 47
installation engineer 10

L

language setting 67
liability 3

M

maintenance
  finalising 92
  gas-side 92
  perform 89
mode
  ERROR 54
  SERVICE REQUIRED 54

N

navigation buttons 51

O

ON mode 61

P

packaging 19
PC connection 52
protection 16
pump 70
push buttons 51

S

scrolling 51
service check 10, 87
service engineer 10
service required 54
setting date 67
setting display scroll speed 70
setting service interval 70
starting up 55
symbol
  installation engineer 10
  service engineer 10
  user 10

T

target groups 10
ThermoControl 51
  controls 51
trademarks 3

U

user 10

W

warranty 93

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